EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING

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BY

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(MAY, 2020)

DECLARATION

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Dedicated

To

My Family

&

Teachers

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Dr. Ashish Kumar....

LIST OF ABBREVIATIONS

ACL	Anterior cruciate ligament
BEP	Bone end plates
CRP	C reactive protein
COX-2	Cyclooxygenase 2
CR	Cruciate retaining
DVT	Deep vein thrombosis
DMARDS	Disease modifying antirheumatic drug
ECM	Extracellular matrix
ESR	Erythrocyte sedimentation rate
LBA	Low backache
NSAIDS	Non steroidal anti-inflammatory drugs
OA	Osteoarthritis
PRE-OP	Pre operatively
POST-OP	Post operatively
PCL	Posterior cruciate ligament
ROM	Range of motion
SF-36	Short form 36
TKJR	Total knee joint replacement
TKA	Total knee arthroplasty
TKR	Total knee replacement
VAS	Visual analogue scale
WOMAC	The western ontario and mc master universities osteoarthritis index
WBC	White blood cell

ABSTRACT

Introduction: TKR is the mainstay of treatment for the people with end stage OA. Being high cost and high volume procedure with worldwide demand it has become imperative to measure the response of surgery. In the present study TKR outcomes were measured and analysed using WOMAC score and VAS score. Anterior knee pain is the most common problem which persists after TKR that can occur due to complications such as infections, wound dehiscence, patella maltracking. These complications were also analysed.

Aims & Objectives: Evaluation of anterior knee pain and other complications in total knee arthroplasty without patellar resurfacing.

Materials and Methods: A retrospective and prospective study including 199 patients was carried out in the department of Orthopedics, DMCH, and Ludhiana. Proforma were filled preoperatively and at 0,6,24 week's follow-up and WOMAC score and VAS score were filled and results were tabulated.

Results: Out of the 199 patients, 127 patients were females constituting 64.1% of total whereas 71 patients were male constituting 35.9% of total with Male to female ratio 1: 1.7. Mean Right side pre-op WOMAC score was 82.4 and VAS score was 8.6. Mean Left side pre-op WOMAC score was 81.7 and VAS score was 8.4. Mean Right side postop at 24 weeks WOMAC score was 2.6 and VAS score 0.5. Mean Left side post op 24 weeks WOMAC score was 2.1 and VAS score 0.3. One patient died due to cardiovascular event.

Conclusion : we conclude that the incidence of anterior knee pain even without patellar resurfacing is quite low. In our study, we have shown that the incidence of anterior knee pain without patellar resurfacing is comparable to other national and international studies. So we recommend the total knee replacement without patellar resurfacing is beneficial as incidence of anterior knee pain is almost comparable with and without patellar resurfacing, where as the complications of patella resurfacing are higher.

Keywords: TKR, WOMAC, VAS, ANTERIOR KNEE PAIN

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INTRODUCTION

Osteoarthritis of the knee is a relatively common condition affecting approximately 10% of the general population above the age of 55 years. [1] The increased life expectancy and the tendency for obesity in younger individuals have led to increased prevalence of the symptomatic knee osteoarthritis with broad variation among different population. There is no permanent cure but the prevailing treatment is aimed at reducing pain and improving joint function. The diagnosis is made clinically and then confirmed radiologicaly. Management is on individual basis and requires combination of treatment options. Which varies from non-pharmacological, pharmacological, surgery and arthroscopic debridement and lavage.(2)

TKR is one of the most common and successful surgical interventions, providing substantial relief from pain and improvement in functional disability in patients with knee arthritis [3]

TKR is surgical procedure re-surfacing the damaged knee with an artificial joint or prosthesis. Three different prosthesis are used - Constrained prosthesis, Non constrained prosthesis and semi constrained prosthesis (4)

Pain in the anterior knee is one of the most common causes of sustained problems after total knee replacement. It can occur in patients with or without patellar resurfacing. There are functional and mechanical causes of anterior knee pain that should be distinguished.[5]

Complications can occur in any surgery but we should focus to prevent or reduce the complications. To effectively reduce chronic pain in the perioperative period there should be pain management, blood conservation, deep vein thrombosis (DVT) and infection prevention, and inpatient rehabilitation. Chronic pain is a highly prevalent adverse event after TKR and should be considered along with infection, DVT and other complications in the safety profile of interventions. Being widely used TKR should be evaluated post operatively for pain and functional outcomes in the postoperative period. These can be analysed using WOMAC score, Oxford Knee score, Knee society

clinical rating system. Poor outcomes of TKR needs critical care. A good outcome measure should be accessible, should have reliability and validity. In addition have minimal burden on responders and responsive to change. No single outcome measure is suitable for every clinical situation, it is combination of different measures. WOMAC is considered excellent option for measuring response to TKR and have extensive range of translations [6] The Visual analogue scale is the most commonly used outcome measure on which intensity of pain is presented on 100mm horizontal line. It is simple, reliable and valid.[7]As pain is subjective so it becomes imperative to measure it for making it standardized. The purpose of this study is to analyse and compare preoperative WOMAC and VAS scores at 0, 6, 24 weeks and to note complications.

AIMS AND OBJECTIVES OF THE STUDY

1. Evaluation of anterior knee pain and other complications in total knee arthroplasty without patellar resurfacing.

REVIEW OF LITERATURE

Osteoarthritis (OA) is a multifactorial condition associated with degeneration of the joint affecting millions of people worldwide. It is one of the most common causes of chronic disability in adults causing pain and alteration of the joint function [8]. OA is not just wear and tear but also is driven by a number of inflammatory mediators within the affected joint. There are many risk factors such as age, gender, genetic predisposition, and mechanical factors which includes malalignment and abnormal joint shape. Pathological changes in joints are degradation of articular cartilage, thickening of subchondral bone, osteophyte formation, and synovial inflammation, hypertrophy of joint capsule and degeneration of ligaments.

Ligaments help in maintaining joint tissue homeostasis as after anterior cruciate ligament injury there is increased risk of OA [9]. Articular cartilage normally is bound to thin plate of bone called bone end plate (BEP) and blood supply to the articular cartilage is through penetration of blood vessels in the marrow through these BEP. Cartilage is made up mainly of Extracellular matrix (ECM) in which are scattered chondrocytes. ECM mainly consists of water, collagen, and proteoglycans. Other noncollagenous proteins and glycoproteins are present in lesser amounts. The main proteoglycan is aggrecan which by imbibing water swells and generates a high swelling pressure. The triple helix structure of the polypeptide chains of collagen provides articular cartilage with important shear and tensile properties, thereby stabilizing the matrix.[10] In healthy adults cartilage in the resting state is non stressed and chondrocytes are quiescent that is these have very little turnover of cartilage matrix but in OA these chondrocytes activate and there occurs proliferation, clustering and increased production of both matrix proteins and matrix degrading enzymes. The matrix degrading enzymes are aggrecanases and collagenases which are members of Matrix metalloproteinase family.[11] OA can occur in any synovial joint of the body but most commonly is seen in hands, knees and hips. The cause of pain in the joint may be from joint capsule,

periosteum, synovium or subchondral bone as these are richly innervated. Cartilage being aneural cannot directly be the cause of pain. Diagnosis of OA is made both clinically and radiographically. Clinical symptoms include pain, stiffness, crepitus and increased age with absence of systemic features like fever. The joint pain in OA increases during activity and is relieved by rest. Radio-graphically OA is seen as joint space narrowing, osteophytes, and sometimes changes in subchondral bone [12] MRI is useful in ruling out other causes of knee pain which includes avascular necrosis and osteochondritis dissecans.[13] Being a non -inflammatory arthritis laboratory findings are normal. Joint aspirate can be performed to rule out septic arthritis, gout and pseudogout. Synovial fluid from a case of OA will be clear, viscous and leucocyte count <2000/mm^3. Management includes control of pain, improve function and alter the disease process and its consequences. Management is on individual basis. Stepwise algorithm for the management of OA: Non pharmacological management which includes Exercise, weight loss, appropriate footwear, if pain persists then physiotherapy, braces and simple analgesics. Pharmacological management includes NSAIDS, DMARDS. The most commonly used existing treatments (such as NSAIDs, cyclo-oxygenase-2 (COX 2) inhibitors) have adverse and toxic effects and is overall less beneficial as compared with conservative interventions such as exercise, weight loss, braces, and orthotics[14].

Total knee replacement (TKR) is the best option of treatment for the patients suffering from extreme pain and functional limitations.

Indications of TKR are significant pain related to tibiofemoral joint and patelofemoral joint .X-ray findings show significant narrowing of joint space, formation of osteophytes, subchondral sclerosis and subchondral cyst formation.

Evidence for knee replacement for osteoarthritis done by Dieppe et al. [15] from 1999 found no evidence-based indications for TKR in patients with osteoarthritis but identified 3 studies that reported daily pain, radiological evidence of loss of joint space, severity of functional impairment, and high patient motivation to have the procedure were

indications for TKR. Active infection was an absolute contraindication, and young age (< 60 years), poor compliance, regional pain disorders, and unrealistic expectations were relative contraindications.

TKR is surgical procedure that replaces damaged articular cartilage of knee with an artificial joint or prosthesis. Three different prosthesis are used - Constrained prosthesis, Non constrained prosthesis and semi constrained prosthesis. Constrained prosthesis also called as hinged is used for the patients in whom ligaments and muscles cannot provide stability to the knee prosthesis. Non constrained are used in those whose ligaments and muscles can provide stability to the prosthesis and semi constrained prosthesis provide some stability to the knee instead of relying entirely on patients ligaments and muscles. Non constrained prosthesis is the most commonly used one. Three modalities can be used to keep the knee replacement prosthesis in place- cemented, non-cemented and hybrid fixation. Polymethylmethacrylate is used to fix the prosthesis to the bones in cemented procedure. In this cement allows the prosthesis to fit excellently to the bone, even if there are bone irregularities. A patient is able to walk immediately after the surgery. If the cement loosens revision surgery is difficult. In non-cemented procedure bone is allowed to grow in the prosthesis which has a rough porous surface, so here there is no need of cement. Metal pegs are used to fix the prosthesis into place. But in this procedure the recovery time is longer. The advantage over the cemented process is that if the prosthesis loosen over time, then less bone loss occurs due to lack of irritant cement. Hybrid fixation combine the above two procedures [4].

The number of TKA procedures has been raised by 601%, reaching an estimated 3.48 million procedures annually from 2005 to 2030.TKA is the most commonly performed inpatient surgical procedure within the USA.[16]

Anatomy

Knee is the largest synovial joint in the body [17]. The patellofemoral and tibiofemoral are the two articulations of the knee joint functionally. Transmission of body weight from the femur to the tibia is provided by

tibiofemoral joint while providing hinge-like, sagittal plane joint rotation along with a small degree of tibial axial rotation [18].

The patellofemoral articulation also known as the extensor mechanism helps in extension of the knee. Functionally, the quadriceps also helps during gait, running, or jumping. In some cases of knee dislocation, as the buttonholing of the lateral femoral condyle through the lateral retinaculum that occurs in a posterolateral dislocation or in the tears of the vastus medialis obliqus and vastus medialis that can occur with capsular ligament injury extensor mechanism is involved [19]

Bones forming Knee joint:

Femur- The distal end of femur is expanded and has two condyles lateral and medial which are confluent anteriorly and continue into shaft and separated posteriorly by a deep intercondylar fossa and project beyond the plane of the popliteal surface.[20]

Patella- It is a sesamoid bone and is present in the retinacular layer of the extensor mechanism and patellar tendon is attached distally and the vastus intermedius proximally. The patella articulates with anterior articular surface of the distal femur. Just like patella the lateral portion of the femoral sulcus is relatively broader and contains a higher lateral ridge than the medial portion. This topography contributes to some bony stability to the joint when the patella is engaged in the sulcus at an angle of approximately 45 degrees of knee flexion [18]

Tibia- The tibia expanded proximal end acts as bearing surface for body weight transmitted through the femur. Tibia has medial and lateral condyles. An intercondylar area and the tibial tuberosity. [21]

Tibiofemoral joint:

Femur surface-

The femoral condyles, having articular cartilage, are almost convex. Medial condyle of femur has two arc of circle in sagittal view. According to this view, the anterior arc makes contact with the tibia near extension and is part of a virtual circle of larger radius than the more

posterior arc, which makes contact during flexion. The lateral femoral condyle is believed to describe a single arc and thus to possess a single radius of curvature. [22]

Tibiofemoral congruence is improved by the meniscus, which are shaped to produce concavity of the surfaces presented to the femur; the combined lateral tibiomeniscal surface is deeper. The lateral femoral condyle has a faint groove anteriorly which rests on the peripheral edge of the lateral meniscus in full extension. [23]

Proximal tibial surfaces-

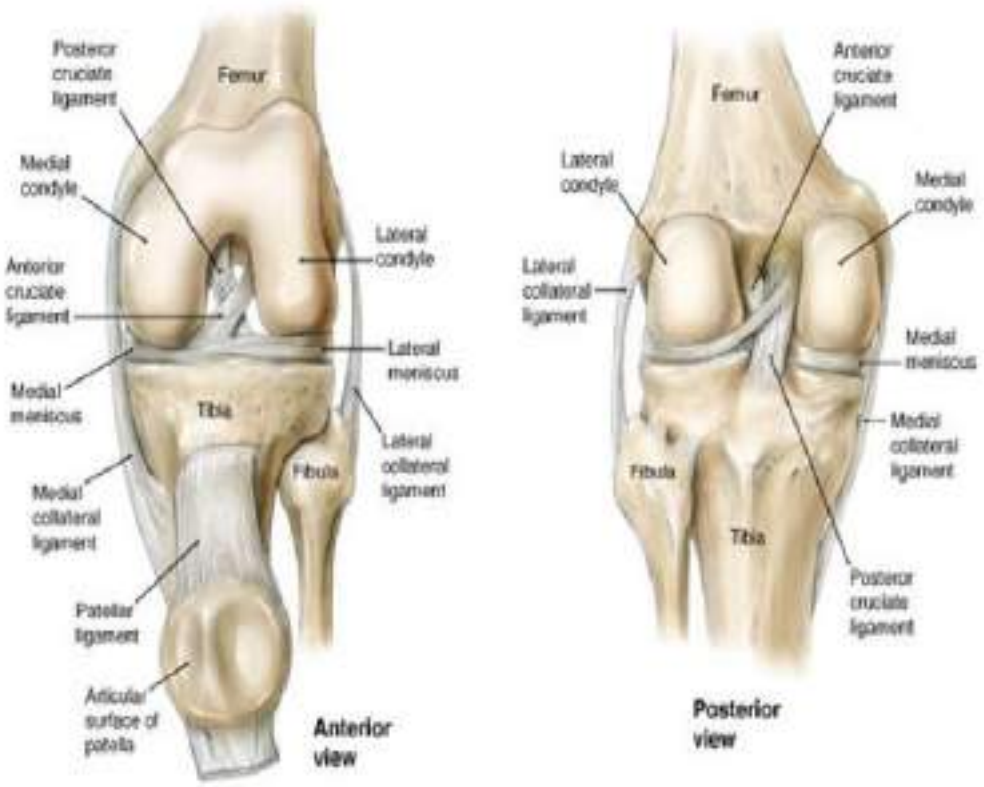
The proximal tibial surface also known as tibial plateau slopes posteriorly and downwards relative to the long axis of the shaft. The tibial plateau is formed of medial and lateral articular facets or surfaces for articulation with the corresponding femoral condyles. The medial patellar retinaculum is attached to the medial tibial condyle along its anterior and medial surfaces, which are marked by vascular foramina.

The medial articular surface is oval (long axis anteroposterior) and longer than the lateral articular surface. Around its anterior, medial, and posterior margins, it is related to the medial meniscus; the meniscus imprint; wider posteriorly and narrow anteriormedialy, is often discernible. The surfaces is flat in its posterior half and the anterior half slopes upwards about 10 degree. Much of the posterior surface is covered by the meniscus, so that overall a concave surface is presented to the medial femoral condyle. Its lateral margin is raised as it reaches the intercondylar region.

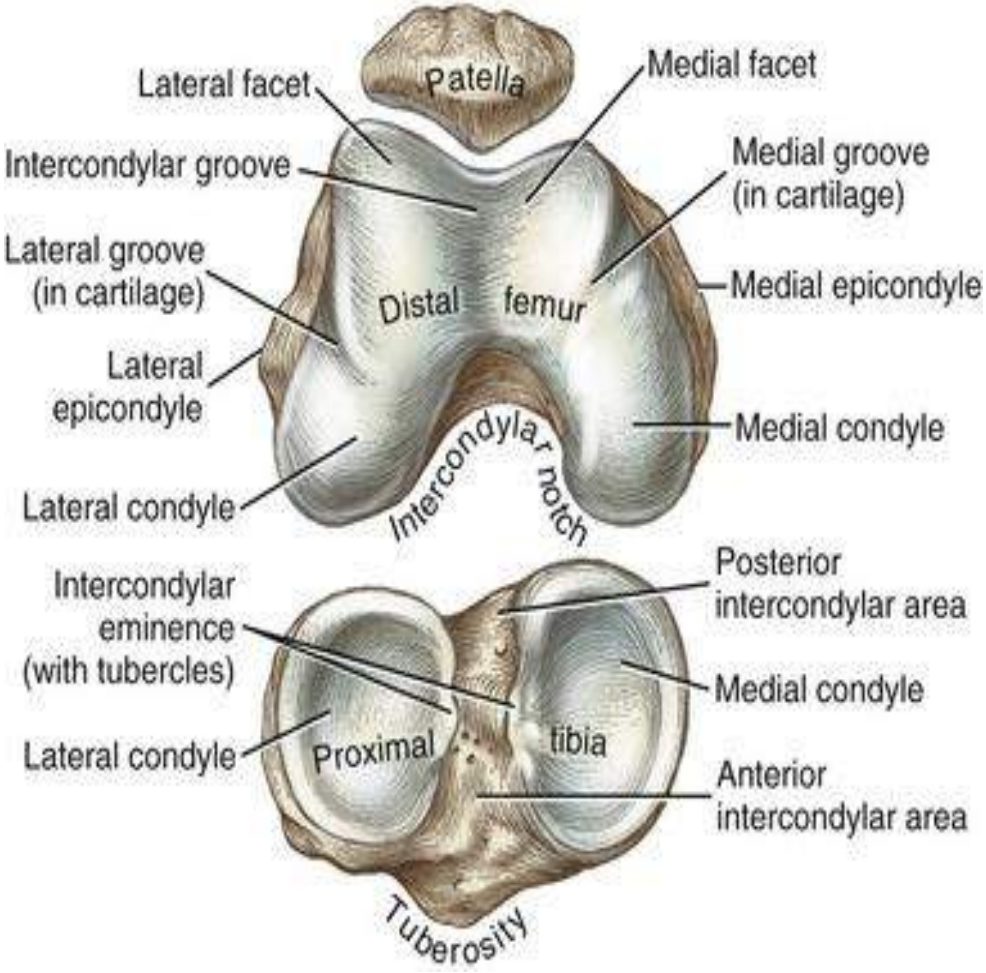
The lateral tibial condyle overhangs the shaft posterolaterally above a small circular facet for articulation with the fibula. The lateral articular surface is more circular and coapted to its meniscus. Overall this creates a rather convex surface, so that, with the lateral femoral condyle in contact, there are anterior and posterior recesses which are occupied by the anterior and posterior meniscal horns. Elsewhere the surface has a raised medial margin that spreads to the lateral intercondylar tubercle. Its articular margin are sharp, except posterolaterally, where the edge is round and smooth; here the tendon of popliteus is in contact with bone(16)

Patellofemoral Joint:

The patellofemoral joint is synovial joint. The articular surface of patella extends on the anterior surface of both femoral condyles. The ‘odd’ facet on the articular surface of the patella contact the anterolateral aspect of the medial femoral condyle in full flexion, when the highest lateral patellar surface facet contacts the anterior part of the lateral femoral condyle. As the knee extends, the middle patellar facets contact the lower half of the femoral surface. In full extension only the lowest patellar facet are in contact with the femur. Thus, on flexion the patellofemoral contact point moves proximally. The contact area also broadens to call with the increasing stress that accompanies progressive flexion.



PICTURE-1: BONES FORMING KNEE



PICTURE-2: ARTICULAR SURFACES

Capsular ligaments -

Functionally capsular ligaments are divided into thirds. The anterior-third capsular ligaments are the medial and lateral retinacular ligaments of the extensor mechanism which attach distally to the tibia and to the anterior horns of the menisci. The extensor mechanism tendinous and capsular structures are organized into three layers - The most superficial, the arciform layer that is a thin peritendinous membrane continuing from the sartorial fascia medially and the biceps fascia laterally and arching to blend anteriorly across the patella and patellar tendon.

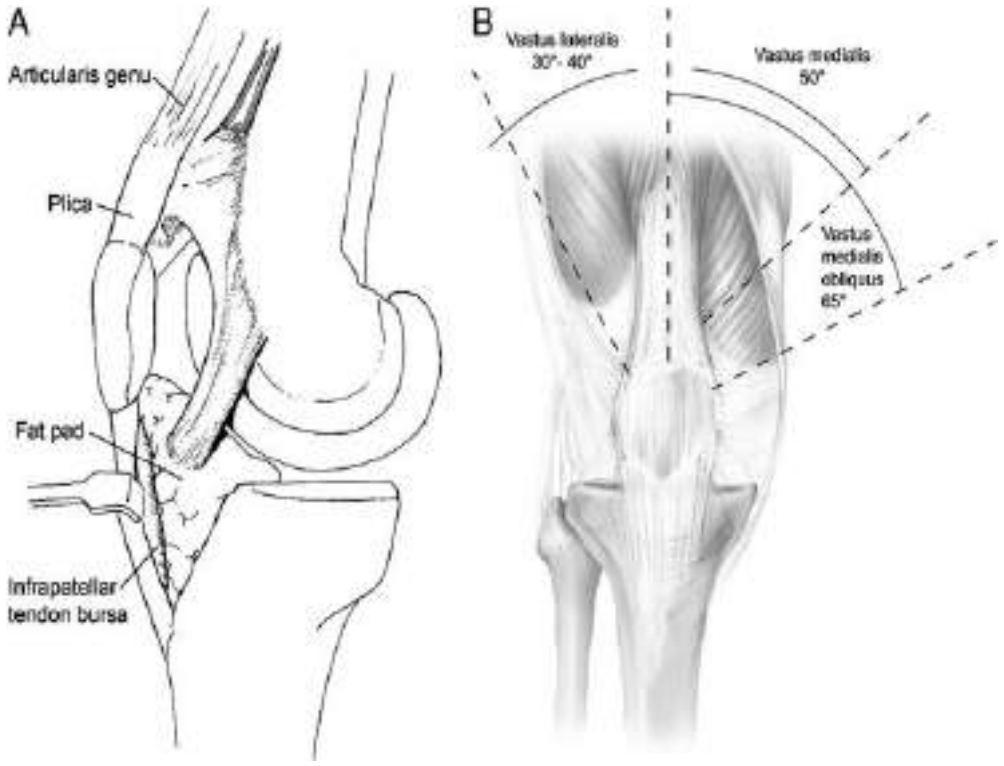
The intermediate layer, or retinacular layer, is made up of the anterior-third capsule, or retinaculum, and its condensations, and the illiopatellar ligament laterally, lying superficial to the retinaculum on the anterolateral aspect of the knee. Patellofemoral ligaments course from medial or lateral isometric points to corresponding superior poles of the patella. They course along the distal and deep border of the vastus medialis obliqus and vastus lateralis obliqus and serve to anchor the distal femoral origin of these muscles. It implies a dynamic action of the muscle on the ligament. The lateral patellofemoral ligament courses from the proximal lateral epicondyle to the vastus lateralis tendon insertion on the patella. The medial patellofemoral ligament, courses from the adductor tubercle to the vastus medialis obliqus insertion on the patella. On the tibial side, the corresponding condensations of the retina- culum have no direct muscular input and are more purely static. The medial patellotibial ligament extends from the inferomedial patella to the anteromedial scar of the proximal tibia. Its clinical significance is in distal extensor mechanism reconstruction in juvenile patients with excessive Q angles and an open proximal tibial physis. The lateral patellotibial ligament courses from the inferolateral patella to the lateral tibial tubercle deep to the iliopatellar ligament.

Quadriceps

It plays an important role in extensor mechanism. The infrapatellar tendon bursa and fat pad isolate the tendon from the articular rim of the underlying tibia to its insertion on the tibial tubercle as seen in Fig A.

Articularis genu does not directly insert into patella but inserts into plica. The patellar tendon extends from the inferior pole of the patella and inserts on the tibial tubercle. Proximal to the tubercle it is separated from the underlying tibia by the infrapatellar tendon bursa.

The major heads of the quadriceps muscle group. A balance of muscle mass and geometric angle of insertion (to the anatomic axis of the femur) exert an influence on patellar stability as can be seen in Fig. B



Plica is remnant of embryologic development. It is tissue-paper thin normally but can become thickened, scarred, and contracted as a consequence of injury and causes ankylosis and painful tethering of the quadriceps tendon [18]

Fat Pad consists of primarily adipose tissue and a small vascular arcade that arises from convergence of the inferior medial and inferior lateral geniculate arteries and provides the main blood supply to the anterior cruciate ligament (ACL). Upon injury the structure may fibrose causing ankylosis, painful extension block, and infrapatellar contracture of both the patella and patellar tendon [24]

Menisci

These serve a variety of biomechanical functions, such as load bearing, forming a contact area, guiding rotation, and stabilizing translation. The medial meniscus is broader than the lateral meniscus but its body is a little thinner. It opens more widely to the intercondylar notch and has a relatively flat undersurface. It is anchored in the central posterior region of the intercondylar spine near the fovea centralis and anterior to the anterior intermeniscal ligament that courses across to become confluent with the lateral mid- third capsular ligament.

The lateral meniscus is more saucer-shaped and is more triangular-shaped in cross section than the wedge- shaped medial meniscus. This shape gives rise to the so- called bowtie appearance of the lateral meniscus as seen in sagittal sections of magnetic resonance imaging scans. Its anterocentral attachment merges with the insertion of the ACL. Posteriorly, it anchors both on the lateral tibial eminence band and also through the ligaments of Wrisberg and Humphry. Its peripheral attachment parallels that of the medial meniscus; however, at the junction of the anterior two-thirds and posterior third, the peripheral attachment is interrupted by the popliteal hiatus.

Cruciate ligaments:

Anterior cruciate ligament (ACL) - originates within the postero-lateral surface of the intercondylar notch and courses distally and anteriorly to insert on the intercondylar eminence. It contains 2 bundles—an anteromedial and a postero-lateral bundle. There are varying degrees of tension in these bundles based on flexion angle. Antero-medial bundle is tighter in extension and the postero-lateral bundle is tighter in flexion. These bundles spiral from lateral to medial, thus wrapping upon themselves and increasing tension as the tibia internally rotates. In full extension, the anterior surface of the ACL lies against the intercondylar shelf assisting the ligament in preventing hyperextension. In addition to this function, the ACL is most commonly thought of as primarily resisting anterior translation, although it is biomechanically best postured to do so at approximately 20 degrees of

flexion. ACL also guides rotation of the tibia during the screw-home mechanism upon knee extension. It also couples translation to tibial axial rotation.

Posterior Cruciate Ligament (PCL)-The PCL originates on the medial surface of the intercondylar notch extending distally to insert on the proximal tibia in the fovea centralis. As such, its insertion is anterior to the posterior extent of the femoral and tibial condyles and in line with the posterior cortex of the femur and tibia. Its proximal origin is also in line with the epicondylar axis of the femur and, for practical purposes, represents the center of axial rotation of the knee. The PCL has 2 bundles—a posteromedial and an anterolateral bundle. The posteromedial bundle is more taut in extension, and the anterolateral bundle is more taut in flexion. Again, internal rotation of the tibia will not only wrap these bundles upon themselves, as occurs in 90-degree anteroposterior drawer tests in internal rotation as a test of PCL competency, but as also results in the ACL and PCL ligaments wrapping upon themselves. The ligaments of Wrisberg and Humphry, originating from the posterior capsular attachments of the lateral meniscus, course forward to attach posteriorly and anteriorly, respectively, with the PCL on the femur. In full extension, the PCL is the primary restraint to any translation or coronal plane rotation (abduction or adduction stress). Unlike the ACL, because of its association with the posterior capsule, blood supply is not permanently lost with a substance tear of the PCL. Thus, primary repair of these injuries is possible.[18]

Surgical Technique

Anterior midline incision is the frequently used incision for primary TKR and medial parapatellar retinacular approach is the standard retinacular incision. Knee is flexed and anterior cruciate ligament, anterior horns of medial and lateral menisci along with any osteophytes are removed. At valgus angle distal femoral cut is made perpendicular to the predetermined mechanical axis of the femur. If the transepicondylar is used as a reference point for femoral rotation, then the posterior femoral cut is made parallel to a line drawn between the

medial and lateral femoral epicondyles. Anteriorposterior axis is determined by drawing a line between the bottom of the sulcus of the femur and top of the intercondylar notch and posterior femoral cut is made parallel to this axis. When the medial condyles are referenced, cut is made in 3 degrees of external rotation off a line between them.

Tibia is cut perpendicular to the axis with 0 to 5 degrees of posterior slope and approximately 6 to 8mm of proximal al tibia is removed as measured from the intact compartment. Flexion and extension gaps are balanced at a time by placing spacer blocks or a tensioner within the gaps with knee in flexion and extension. Varus valgus balance is fine-tuned with further medial or lateral releases. The entry portal for the femoral intramedullary alignment rod is placed a few millimeters medial to the midline, at a point anterior to the origin of the PCL. Tibial extramedullary alignment guide 3mm medial to the midline of the ankle in an effort to centre the guide over the middle of the talar dome.[25]

Correction of the varus deformity is done by sequentially releasing the semimembranous aponeurosis, superficial medial collateral ligament and pes anserinus insertions and also by checking for stability at each stage.

To correct Varus deformity release the iliotibial band at the level of the joint line. For greater deformity strip the lateral collateral ligament off the lateral condyle along with the popliteus tendon.[26]

PICTURE-3:

PATIENT POSITION ON OT TABLE

PICTURE-4:

MIDLINE SKIN INCISION

PICTURE-5:

TIBIAL JIG

PICTURE-6:

FEMORAL JIG

PICTURE-7:

FEMORAL BOX CUT

PICTURE-8:

TKR IMPLANT

TKRs relieve pain and improve mobility, about 30 000 TKRs are carried out each year in England and Wales and there is likely to be a 30% increase in the need for all total joint replacements (TJRs) in the next three decades, due to changing demography.[27-28] Studies have shown that the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and the short form 36-item (SF-36) are the instruments of choice for evaluation of the outcome of knee replacement surgery in osteoarthritis.[29].For assessing outcomes of surgical procedures and accurately measuring healthcare quality complications are needed to be reported.

Stedman's Medical Dictionary defines a medical complication as "a morbid process or event occurring during a disease which is not an essential part of the disease, although it may result from it or from independent causes" [30] The most common complications of TKR are Deep Vein Thrombosis(DVT), infection anterior knee pain, stiffness, loosening and osteolysis. DVT occurs due to immobilisation caused by surgery. Blood clots get formed in large veins, usually in legs or pelvis. Prophylactically Aspirin or low molecular weight heparin (s) (LMWH) and/or compresssion Stockings Are Used for The Prevention of DVT. Antibiotics for 24 hours are started to prevent infection. The two main reasons for the revision surgery are loosening of the prosthesis and osteolysis.

Death is defined as – Death for any reason during the first 90 days after TKA (cause of death and relation to index TKA should be recorded [8].

Pain after total knee arthroplasty (TKA) is a common observation in about 20% of the patients. Early revision surgery is required within 5 years in some cases. With clinical examinations and standard radiographs only, most of the causes can be detected whereas the unexplained painful TKA is still a question for the surgeon. A painful TKA is related to a lot of medical, social and sometimes legal problems. Even though the aim of primary TKA is reduction of pain, finer function and long-term survival around 60–80% of all revision

surgeries are performed during the first 2–5 years after the primary implantation [31].

Type of pain should be stressed upon-

Night and rest pain - Infection and joint effusion or referred neurogenic

Pain on descending stairs and chair raising-Flexion gap instability and femur malrotation

Anterior knee pain -Patella maltracking and overuse tendinitis and neurinoma

Posterior knee pain -Posterior soft tissue tightness and Popliteus tendinitis

Pain on full extension -Anterior soft tissue impingement Posterior tightness

Pain on full flexion -Post impingement (offset/osteophytes) and patella impingement or tightness

Starting pain -Loose components and Tibia and/or femur forceps pain

Weight-bearing pain- Unspecific and mainly mechanical cause.

For distinguishing intra- and extraarticular causes of pain local anaesthetic injections might help. Any intra-articular problem at the interface such as loosening or synovitis provides immediate but temporarily pain relief[32]. Vince et al. described also the possible cause of instability that might be due to the lack of correct balancing during primary surgery, component malalignment, late ligamentous insufficiency, extensor mechanism problems, inappropriate prosthetic design or purely surgical errors.[33]

Bong and Di Cesare divided the cause of stiffness post TKA in patients-related factor and technical-related factors. The patient-related factors were severe obesity, low compliance, intolerance to pain and failed physiotherapy. The technical factors that were included in the study -overstuffing of the patella, mismatch of the flexion and extension gaps, inaccurate ligament balancing, component malposition, oversized components, excessive tightening of the extensor mechanism and joint line elevation. [34] Gustke laid stress on the important role of analysing the joint line position preoperatively. He

found that in surgery even with more constraint implants a clinical relevant instability might persist if the joint line is not corrected. [35]

Porteous et al.[36] have demonstrated the clinical relevance of restoring the joint line. They included 114 cases and found a significantly better outcome when the joint line was preserved within 5 mm. This was the case in 64% of the cases only. Distal femoral augments might be required much more frequently than expected.

Every painful TKA with no obvious reason for failure (infection, fracture, implant breakage, clear loosening and/ or severe osteolysis) should have an intensive trial of conservative therapy for a minimum of 3 months which includes pain control with painkillers and physical therapy. The physiotherapy should mainly focus on the underlying problem and cause of pain. This programme needs to be explained to the patient to allow him to understand the necessity of this trial therapy .Most of these patients show muscular atrophy and/or imbalances, which should be addressed also. Daily home exercises and training programmes in combination with braces and other supporting devices should be performed [37]

In a population-based cohort of patients undergoing primary TKA, in the 90-day period following surgery, 6.7% of patients experienced a new cardiac event, defined as myocardial infarction, congestive heart failure, or cardiac arrhythmia, and 4.9% of patients experienced a thromboembolic event, defined as deep venous thrombosis or pulmonary embolism. [38]

Radiologists do have role in assessment of fractures, infection, component failure, abnormal mechanics, and instability. Examples of failure mechanisms without reliable imaging correlation are metal allergies, chronic regional pain syndrome, and overuse tendinitis [32]

Deep periprosthetic infection is one of the most dreaded complications of total joint replacement. The prevalence of deep infection after TKA is approximately 0.4–2.0%.[39]

The most common organisms are Staphylococcus aureus (50–65%) and Staphylococcus epidermidis (25–30%). Acute infection occurs up to 2 months post-surgery and presents most commonly with swelling,

erythema, and persistent drainage for more than 5–7 days postoperatively. Intermediate infection is from 2 months to 2 years after surgery. Late infection occurs more than 2 years after the initial arthroplasty. The cause usually is hematogenous seeding from a distant source of infection [40]

PICTURE-9:

KNEE JOINT INFECTION WITH DISCHARGING SINUS

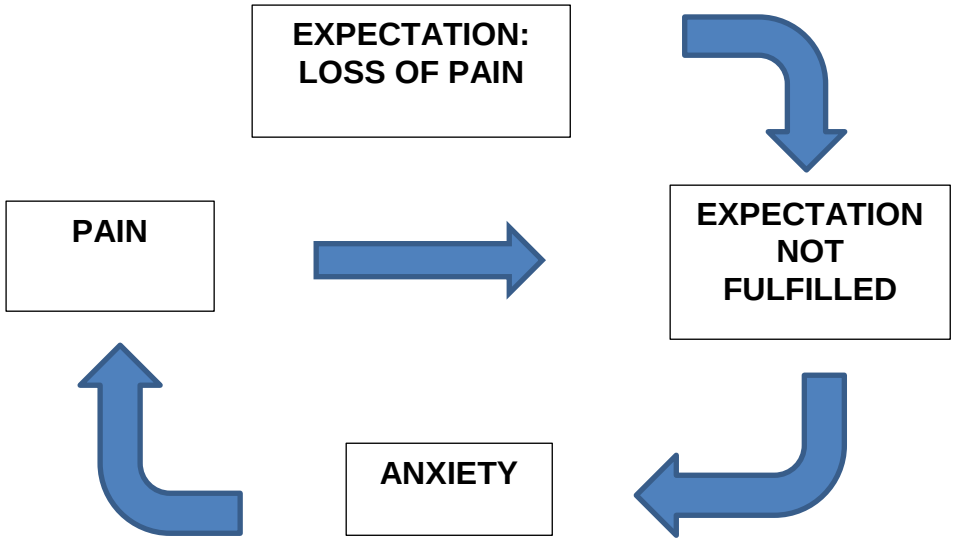
Two nonspecific tests for diagnostic workup of infection are Erythrocyte sedimentation rate (ESR) and C- reactive protein. [39]

A meta-analysis of 2010 showed that interleukin 6 measurement has high sensitivity for periprosthetic joint infections, but this test may not be in common use. [41]

Anterior knee pain is one of the most common causes of sustained problems after total knee replacement. It can occur in patients without patellar resurfacing. There are functional and mechanical causes of anterior knee pain that should be distinguished. Functional causes included problems of inter and intramuscular coordination, which can be allocated to preoperative osteoarthritis. Dynamic valgus malalignment which is a functional cause is not only due to thigh muscles but also due to hip and trunk stabilising muscles. Mechanical causes include offset errors, oversizing, rotational errors of femoral or tibial component, instability, maltracking and chondrolysis, patella baja and aseptic loosening. Reoperation or revision is often necessary in these cases. But it is important to rule out infection in every painful TKA. TKA is done with patellar surfacing and without patellar surfacing. A problem of TKA without patellar resurfacing is chondrolysis and after patellar resurfacing are aseptic loosening, lateral facet syndrome, fractures or “overstuffing”.

First of all physiology of anterior knee pain should be known to cure it. One of the problem is certainly in the fulfillment of the pre-operative expectations shown in the figure 1. [5]

SATISFACTION AFTER TKA:



The vicious cycle if expectations after TKA are not fulfilled:

Insertions of the extensor apparatus is the main source for pain sensation. Disorders of the patellofemoral mechanics lead to local overload of these structures. These mechanical disorders include patellofemoral instability, lateral patellar maltracking or the increased pressure by the extensor mechanism in the sagittal plane. These three disorders can be due to incorrect positions of the components of the prosthesis, valgus malalignment of the lower extremity and instabilities. Valgus malalignment can be caused by the position of the components or by muscular insufficiencies and imbalances (dynamic valgus)[19]. Local peripatellar synovitis, inflammatory changes in the Hoffa fat pad or osseous oedema are other causes of anterior knee pain in TKA patients.[5] Van Jonbergen et al. demonstrated in a systematic review that a peripatellar synovectomy and resection of Hoffa's fat pad have positive effects on pain after TKA .[42] Second revision after TKR for anterior knee pain should be meticulously evaluated and done with care as the success rate varies between 50-60%. [43]Fu et al. conducted a meta-analysis of the efficacy of patellar resurfacing in TKA; ten studies with 1,003 TKA were included. In this study there was no difference in the incidence of anterior knee pain. The risk for

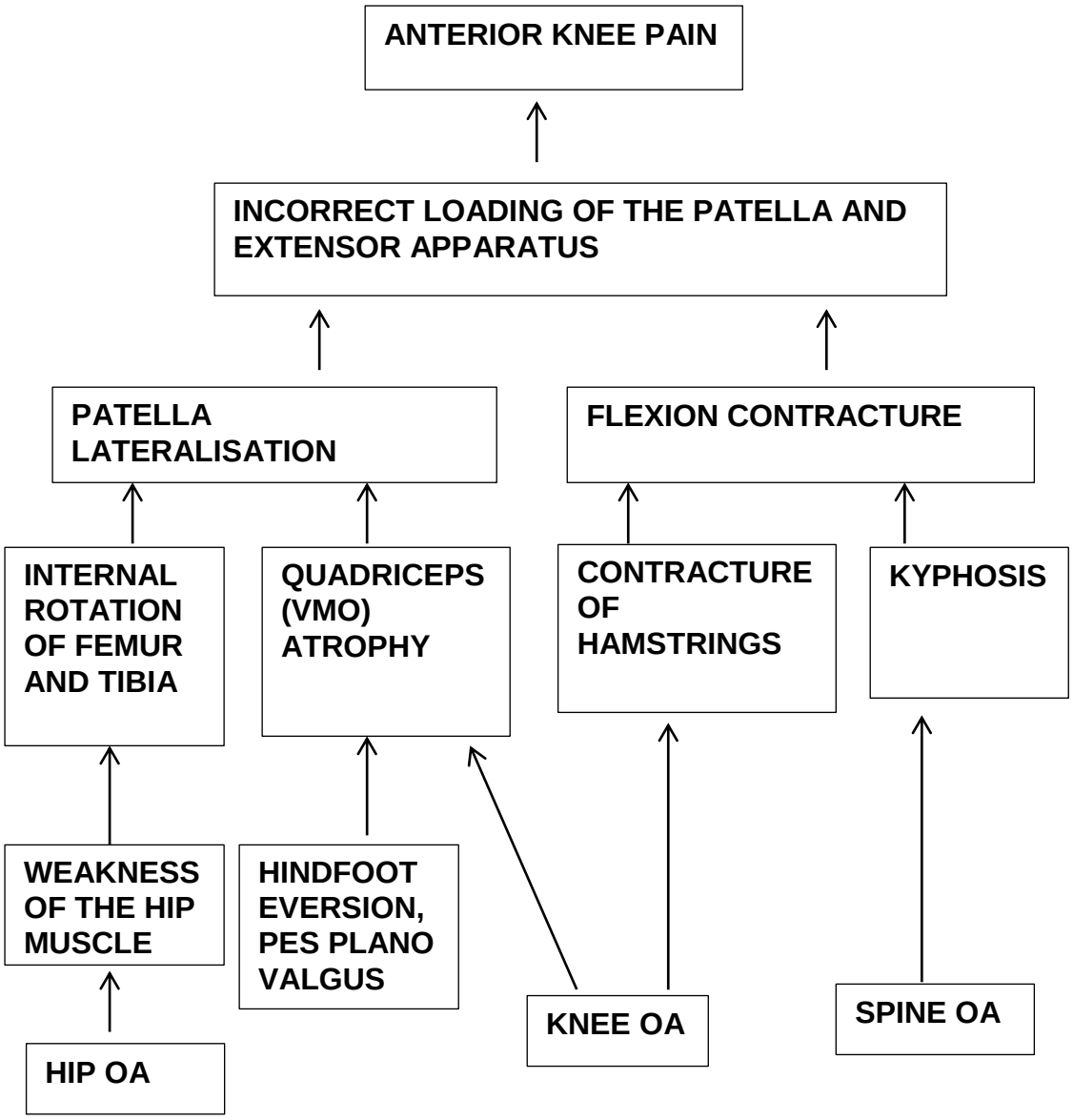
reoperation, however, was lower in the resurfacing group than in the group without resurfacing.[44]

Similar results were published by He et al. This meta-analysis included 16 studies with more than 3,000 knee joints. There was no difference between the two groups in terms of anterior knee pain rate, knee pain score, Knee Society knee score and function. The incidence of reoperations in patients without resurfacing was lower than in patients with resurfacing [45].

One main source for pain sensation are the insertions of the extensor apparatus. Sanchis-Alfonso et al. demonstrated that patients with anterior knee pain had an increased density of nociceptors in the lateral retinaculum and It appears that disorders of the patellofemoral mechanics lead to local overload of these structures.(46,47)

Functional causes of anterior knee pain: In many cases there is functional cause related to preoperative osteoarthritis and not structural cause like preoperative quadriceps weakness may persist after TKA [21]. Imbalance of the quadriceps with weakness of the vastus medialis and increased activation of the vastus lateralis muscle can cause a lateral maltracking of the patella. The preoperative quadriceps weakness caused by osteoarthritis may further get aggravated after implantation of a total knee replacement.[5]

Usually patients presenting with Knee osteoarthritis also have hip osteoarthritis [48]. The weakness of the hip abductors and external rotators can lead to dynamic valgus [5].The valgus position of the knee may not be due to incorrect position of the TKA components but rather by internal rotation of the femur and tibia. Internal rotation of the femur can be caused by a weakness of the hip abductors. Internal rotation of the tibia may be a result of rear foot eversion or pes plano valgus So herein hip arthritis needs to be treated.[5] Dynamic valgus leads to lateral patellar maltracking as it affects the femoropatellar joint [49] and single leg squat can be used to detect.[50]



Above schematic representation shows functional patellofemoral problems after TKA [5]

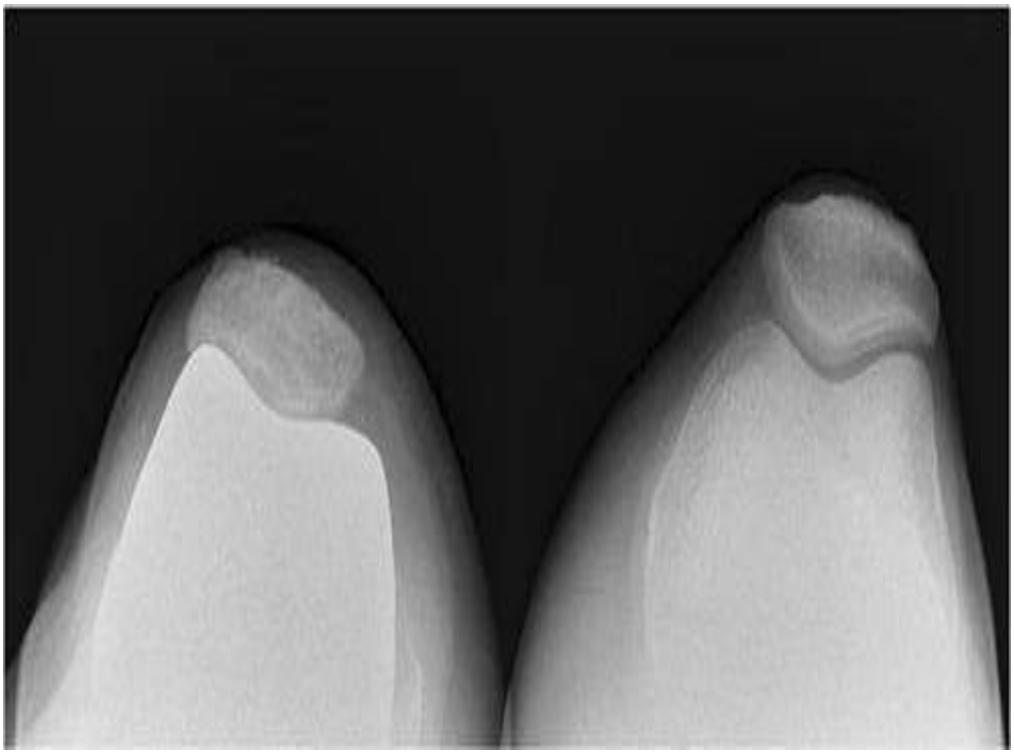
Mechanical causes

Patello-femoral instability and maltracking

Patello-femoral instability is one of the most common causes for revision surgery.

The causes of maltracking can be either insufficient soft tissue balancing or component positioning (patella, femoral rotation, valgus malalignment) [51]

Conventional X-ray (Merchant view) can be used to diagnose Patello-femoral instability or maltracking lateralisation. X- ray below shows patellar maltracking with a lateral osteophyte and increased tilt in a patient with anterior knee pain after TKA [37].

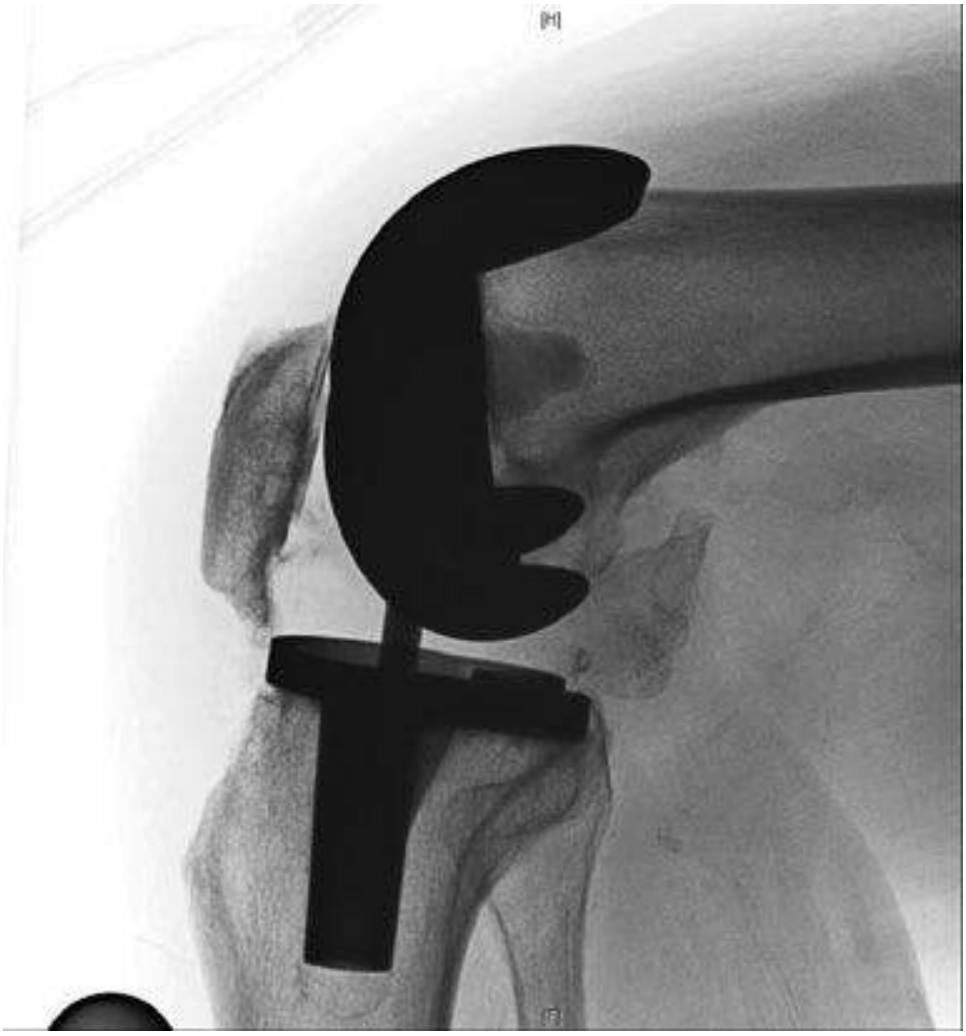


PICTURE-10: PATELLAR MALTRACKING

Prosthetic design play an important role in causing patellofemoral problems. Becher et al. demonstrated that a posterior stabilised (PS) prosthesis design leads to lower patellofemoral joint pressures than a cruciate-retaining (CR) design [52]

Patella Baja is another cause of anterior knee pain after TKR but its incidence is low. Post-operative patella baja can be due to scarring or contracture of the patellar tendon above the tibial tuberosity.

Elevated joint line may give rise to pseudo patella baja that is the patella remains in its normal position in relation to the trochlea, but the distance between the patella and the tibia is reduced. This can be due to femoral or tibial over-resection with a high inlay. The X- ray below is of a patient with anterior knee pain showing extreme patella Baja.[5]



PICTURE-11: PATELLA BAJA

Offset errors of the femoral component

The anterior offset of the femoral component impacts majorly on the mechanics of the patellofemoral joint. An anterior overhang can be due a large femoral component or an overly minimal anterior resection (overstuffing) which leads to increased pressure of the patella and its surrounding structures[53].

However, an increased anterior resection (“undercutting”, “notching”) can also lead to patellofemoral problems. In this case, the passive quadriceps insufficiency can cause anterior knee pain.

Rotational error of the femoral or tibial component increased lateral tilt angle and lateralization of patella can be caused by internally rotated femur or tibial component. [5]

Tibio femoral instability affects patellofemoral joint as due to posterior subluxation contact pressure gets rises.

Treatment of anterior knee pain is dependent on the cause. Non operative treatment is referred for the functional causes which includes exercises and operative treatment for the mechanical causes.

Nakagawa et al. reported that combining quadriceps, hip and trunk stabilization training much better effect can be achieved than with quadriceps training alone. [54]. It is also evident that the functional maltracking of the patella could be corrected temporarily with tape or with knee braces which apply a medially directed force on the patella [55]. Arthroscopy plays an important role in non-revision surgery. In cases of a “maltracking” with lateralisation and increased “tilt” angle an arthroscopic lateral release with peripatellar synovectomy should be considered. Another treatment options are synovectomy and localized arthrolysis for cases with peripatellar adhesion or for patellar clunk syndrome. Even lateral patellar osteophytes can be resected arthroscopically. Arthroscopy also have an important role in the diagnostics of low-grade infections after TKA.[5]

Complications can occur in any surgery but we should focus to prevent or reduce the complications. To effectively reduce chronic pain in the perioperative period there should be pain management, blood conservation, deep vein thrombosis (DVT) and infection prevention, and inpatient rehabilitation. Chronic pain is a highly prevalent adverse event after TKR and should be considered along with infection, DVT and other complications in the safety profile of interventions.

Andreson et al (1996)[56]studied the functional outcome and patient satisfaction in total knee patients over the age of 75 who had undergone 98 primary total knee arthroplasties with a retrospective cohort study, with validated questionnaires that assessed self-reported pain, physical function, mental health, and satisfaction. Overall, 90.8% reported improvement, 88.8% were satisfied with the results of surgery, and 91.8% felt they had made the right decision. Satisfaction was correlated with better pain scores on the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and SF-36 ($P < .05$). Based on this patient-assessed outcome analysis, total knee replacement is a worthwhile and beneficial procedure in the elderly.

Bourne et al (2007) [57] examined the effect of gender, age, diagnosis, and obesity on changes in pre- to postoperative outcome measures (Knee Society clinical rating, WOMAC, and SF-12) in a cohort of 843 consecutive knee arthroplasties in 728 patients. They concluded that Male and female patients had similar increases in postoperative scores. Diagnosis and obesity made no difference in postoperative increases. However, less improvement occurred in health-related quality-of-life outcomes scores with advancing age.

Heiberg, K et al, (2010)[58] did a study described pain and recovery of physical functioning after total knee arthroplasty. A longitudinal design with assessments preoperatively, and 1 week, 3 and 9 months postoperatively was done. Sixty-three patients participated and pain was assessed by visual analogue scale (VAS). Physical functioning was measured by 40-metre timed walking, timed stair-climbing and goniometry. At 9 months the Short Form-36 pain and physical function scales were added to make comparisons with the general population.. Pain score one week after surgery was 40 (standard deviation (SD 23) vs 24 (SD 19) at 3 months (p0.05). The patients' Short-Form 36 pain score did not differ from the general population, while the physical function score was 60 (SD 24) vs 75 (SD 24) ($p<0.001$). Early pain reduction was registered. At 9 months, pain was equal to that in the general population, but a considerable number of patients still had problems in performing strenuous activities.

Drexler et al (2013) [59] concluded that total knee replacement (TKR) is one of the most common operations in Orthopaedics surgery worldwide. Despite its scientific reputation as mainly successful, only 81% to 89% of patients were satisfied with the final result. In their experience, focus on five major factors can improve patient satisfaction rates: correct patient selection, setting of appropriate expectations, avoiding preventable complications, knowledge of the finer points of the operation, and the use of both pre- and post-operative pathways. Awareness of the existence, as well as the identification of predictors of patient-surgeon discordance should potentially help with enhancing patient outcomes.

da Silva et al (2014) [60] conducted a systematic review of the literature in the Medline, Embase, Lilacs and SciELO databases, using the terms: TKA (total knee arthroplasty); TKR (total knee replacement); quality of life; and outcomes.31 articles addressing this topic using various quality-of-life evaluation protocols were selected. SF-36/SF-12, WOMAC and Oxford were the ones most frequently used. The studies made it possible to define that TKA is capable of making an overall improvement in patients' quality of life. Pain and function are among the most important predictors of improvement in quality of life, even when function remains inferior to that of healthy patients and concluded the factors associated negatively were obesity, advanced age, comorbidities, persistence of pain after the procedure and a lengthy wait for surgery

Bin AbdRazak HR and Yeo SJ (2015) [61] concluded that Patient satisfaction without a doubt is an important outcome measure of TKA that has to be taken into consideration by all arthroplasty surgeons. TKA in the Asian population involves a few unique challenges especially with higher demands of post-operative flexion. Improving patient satisfaction following TKA is certainly a challenge, given the already high satisfaction rates. However, there is still that small population that remains dissatisfied. Patient satisfaction should be approached from two prongs—determinants of satisfaction and components of satisfaction. Patient satisfaction can be improved by modifying the elements from these two categories. Patient satisfaction is one of the PROMs used widely in orthopaedic surgery and is fast becoming an important tool to measure surgical outcomes. It is an essential modality of the patient-centred care that we all aim to provide.

Choi & Ra (2016) [62] concluded that TKA has been recognized as a successful treatment for knee arthritis that delivers relatively high satisfaction compared to the other surgical treatments from the orthopedic surgeons perspective. However, it is not uncommon to observe discrepancies in patient-surgeon satisfaction: patients are often less satisfied than the surgeons expect, suggesting the need to develop more objective patient satisfaction measures. One of the

factors most strongly associated with postoperative satisfaction is patient's expectations: unmet expectations result in dissatisfaction. Therefore, it is important for surgeons to reach an agreement with patients on the possible benefits and risks of TKA through extensive discussion and explanation before surgery in order to reduce the likelihood of patient dissatisfaction.

Collados-Maestre et al (2016) [63] studied a cohort of 48 patients with concomitant LBP prospectively matched 1:2 with patients without LBP for gender, age, body mass index and preoperative knee function. LBP severity was measured with the Oswestry Disability Index (ODI). Patient-reported outcomes were assessed with reduced Short-Form (SF12), Western Ontario and McMaster Universities score (WOMAC), and visual analogue scale (VAS) for satisfaction. Functional outcome was assessed with the Knee Society Scores (KSS).The mean postoperative follow-up was 3.2 years. At last follow-up, LBP cohort had significantly worse SF12, WOMAC, KSS and VAS scores than those patients without LBP and concluded that Worse functional and patient-reported outcomes were obtained in patients over 65 years with concomitant LBP, and this was related to the intensity of preoperative LBP. Despite successful outcome in the knee, the LBP usually remains after TKA and this may impair satisfaction and patient-reported outcomes. These patients should be properly informed about their potential outcomes.

Goh et al (2016) [64] conducted a study on 114 patients who underwent 136 primary TKAs. Patients were aged 50 years or younger (mean age: 47.0 years; range: 30-50 years. The main diagnoses were osteoarthritis (85%) and rheumatoid arthritis (10%) and found that 88.8% of patients were satisfied with their surgeries, whereas 86.8% had their expectations fulfilled. Survivorship using revision as an end point was 97.8% at a mean of 7 years (range: 3-16 years) and concluded that Patients aged 50 years or younger undergoing TKA can experience significant improvements in their quality of life, have their expectations met, and be satisfied with their surgeries, at rates similar to those of non-age-restricted populations. Surgeons should inform

them of these benefits and the potential risk of revision surgery in the future, albeit increasingly shown to be low.

Van onsem et al (2016)[65] conducted a prospective study on 113 patients. Preoperatively and postoperatively, the patients completed 107 questions in 5 questionnaires: Knee Injury and Osteoarthritis Outcome Score, Oxford Knee Score, Pain Catastrophizing Scale, Euroqol questionnaire, and Knee Scoring System. Overall satisfaction rate in this study was found to be 88% and identified a significant difference between the satisfied and dissatisfied group when looking at the preoperative questionnaires. Dissatisfied patients had more preoperative symptoms (such as stiffness), and a lower quality of life. They were more likely to ruminate and had a lower preoperative Knee Scoring System satisfaction score.

Lucy C walker et al (2018)[66] did a retrospective cohort consisting of 2589 patients undergoing a primary TKA. Patient demographics, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and short form (SF) 12 scores were collected pre-operatively and 1 year post-operatively and patient satisfaction was assessed at 1 year with four responses: very satisfied, satisfied, dissatisfied or very dissatisfied. Receiver operating characteristic (ROC) curves were and total WOMAC scores defined the categories of excellent, good, fair and poor. At 1 year, there were 1740 (67.5%) very satisfied, 572 (22.2%) satisfied, 190 (7.4%) dissatisfied and 76 (2.9%) very dissatisfied patients. ROC curve analysis identified excellent, good, fair and poor categories for the pain (> 78, 59–78, 44–58, < 44), function (>72, 54-72, 41-53, <41), stiffness (>69, 56-69. 43-55, <43) and total (>75, 56-75, 43-55, < 43) WOMAC scores, respectively.

MATERIALS AND METHODS

Source of Data

This was a retrospective and prospective study. Patients in age group 40 to 80 years with osteoarthrithis of knee undergoing either unilateral or bilateral total knee arthroplasty without patellar resurfacing were studied at the department of Orthopaedics, Dayanand medical college and hospital, Ludhiana from January 2016 to December 2018. The study was carried out by taking an informed consent from the patients willing to be a part of the study.

Inclusion Criteria-

- Patient in age group 40 to 80 years of either sexes with osteoarthrithis of knee undergoing unilateral or bilateral total knee arthroplasty without patellar resurfacing.
- Patient with total knee arthroplasty done on one side undergoing total knee arthroplasty without patellar resurfacing on other side.
- Patients who give informed consent and willing for follow up.

Exclusion Criteria-

- Total knee arthroplasty with patellar resurfacing
- Patient with congenital deformity of hip or lower limb.
- Patients less than 40 years of age.

Sample size-

The study was conducted on a total of 199 patient after taking informed consent, out of which one patient expired post-operatively. 107 patients (54%) underwent bilateral knee replacement, 49 patients (24.7%) with left side total knee replacement and 42 patients (21.2%) with right sided total knee replacement.

Study type-

Retrospective and prospective study of evaluation of anterior knee pain and other complications in total knee arthroplasty without patellar resurfacing.

Duration of study: The present study was conducted in the department of Orthopaedics, Dayanand Medical College and Hospital, Ludhiana over a period of 3 years from January 2016 to December

2018 (2 year retrospective and 1 year prospective).A total number of 199 cases of osteoarthritis were analyzed pre and post -operatively to evaluate anterior knee pain in total knee arthroplasty without patella resurfacing using WOMAC score and VAS score at pre-operation, 0 weeks, 6 weeks and 24 weeks after operation. The study was carried out by taking an informed consent from the patients.

HISTORY

CLINICAL EXAMINATION

RADIOLOGICAL EXAMINATION

INVESTIGATIONS-NECESSARY FOR ANESTHETIC FITNESS

DIAGNOSIS- clinical and radiological

SURGERY-TOTAL KNEE REPLACEMENT

POSTOPERATIVE TREATMENT

ROUTINE ANTIBIOTICS AND ANALGESICS

EVALUATION BY X-RAYS

PHYSIOTHERAPY AND FUNCIONAL REHABILITATION

OUTCOME

Evaluation of anterior knee pain in total knee arthroplasty without patellar resurfacing and other complications was assessed post-operatively at 0 weeks, 6 weeks and 24 weeks and point were assigned as per WOAC score and visual analogue scale.

Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC):

Name: _____

Date:_____

The activities in each category to be rated according to the following scale of difficulty:

0 = None, 1 = Slight, 2 = Moderate, 3 = Very, 4 = Extremely

Stiffness

1. Morning stiffness
2. Stiffness later in the day

Pain

1. Walking on flat surface
2. Going up or down stairs

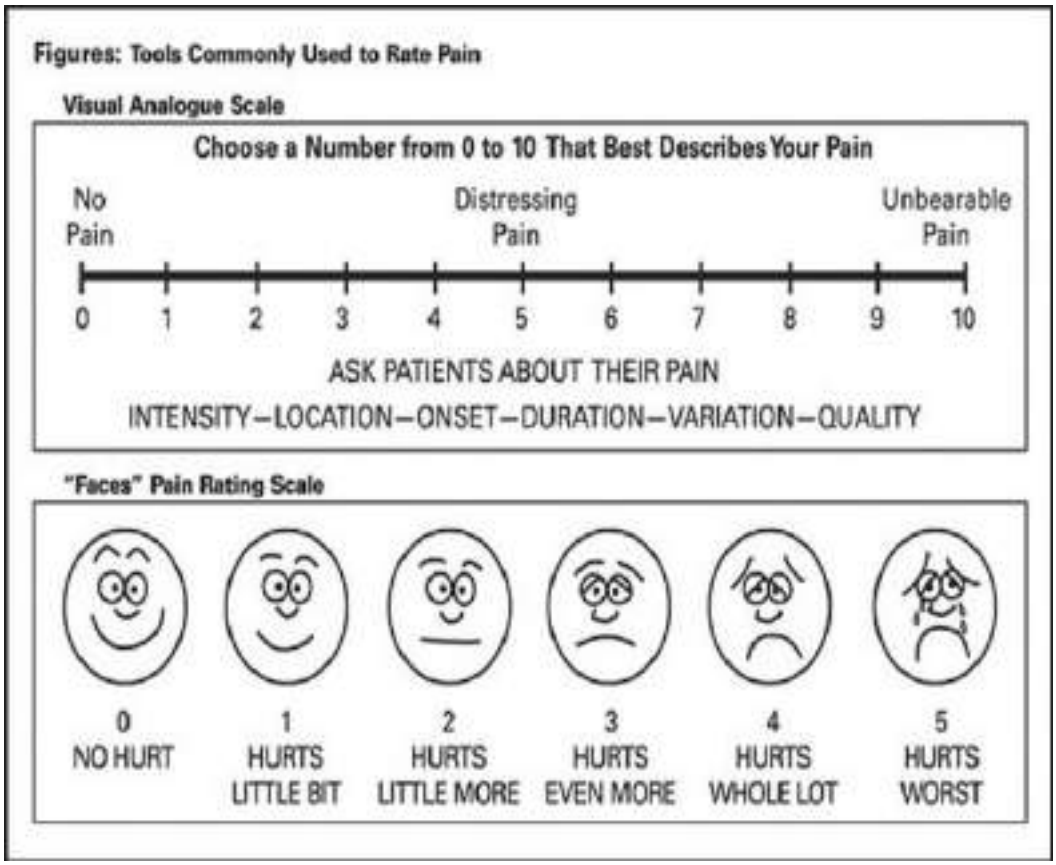
3. At night while in bed
4. At rest
5. Weight bearing

Physical Function

1. Descending stairs
2. Ascending stairs
3. Rising from sitting
4. Standing
5. Bending to floor/pick up an object
6. Walking on flat surface
7. Getting in/out of car
8. Going shopping
9. Putting on socks/stockings
10. Rising from bed
11. Taking off socks/stockings
12. Lying in bed (turning over, maintaining knee position)
13. Getting in/out of bath
14. Sitting
15. Getting on/off toilet
16. Heavy domestic duties
17. Light domestic duties

Total Score: _____ (out of 96)

(Higher Score on the WOMAC indicate worse pain, stiffness and functional limitation)


Figures: Tools Commonly Used to Rate Pain
Visual Analogue Scale
Choose a Number from 0 to 10 That Best Describes Your Pain
No Pain
Distressing Pain
Unbearable Pain
0 1 2 3 4 5 6 7 8 9 10
ASK PATIENTS ABOUT THEIR PAIN
INTENSITY–LOCATION–ONSET–DURATION–VARIATION–QUALITY
"Faces" Pain Rating Scale
0 NO HURT
1 HURTS LITTLE BIT
2 HURTS LITTLE MORE
3 HURTS EVEN MORE
4 HURTS WHOLE LOT
5 HURTS WORST

VISUAL ANALOGUE SCALE:

WOMAC SCORE	0 WEEK	6 WEEK	24 WEEK
0 WEEK			
6 WEEK			
24 WEEK			
VISUAL ANALOGUE SCORE FOR PAIN			
0 WEEK			
6 WEEK			
24 WEEK			
Complications			

WOMAC SCORE AND VAS SCORE AT:

DATA ANALYSIS

Data were described in term of range; mean+- standard deviation (SD), frequencies (number of cases) and relative frequencies (percentage) as appropriate. The pre and post -operative WOMAC and VAS scores were compared using student t- test. Correlation between the scores were calculated. All statistical analysis were considered significant at <0.05 level of significance. The statistical data were analysed using SPSS version 21 versions statistical program for Microsoft Windows.

OBSERVATIONS AND RESULTS

The present study was conducted in the department of Orthopedics, Dayanand Medical College and Hospital, Ludhiana over a period of 3 years from January 2016 to December 2018 (2 year retrospective and 1 year prospective).A total number of 199 diagnosed cases of osteoarthrithis were analysed pre and post -operatively to evaluate anterior knee pain in total knee arthroplasty without patella resurfacing using WOMAC score and VAS score at pre-operation, 0 weeks, 6 weeks and 24 weeks after operation. After the TKA operation, participants showed significant improvement in WOMAC scores and VAS scores when compared to pre-operative scores. However, not all prognoses of patient with TKA are positive. Some patient with total knee arthroplasty show superficial and deep infection of knee, numbness of feet, little improvement in knee function after surgery and complaint of anterior knee pain, difficulty in carrying out daily functional task. One patient was expired post-operatively due to cardio vascular event.

Table 1: Sex distribution of patients

Gender	No. of cases	Percentage
Female	127	64.1%
Male	71	35.9%
Total	198	100.0%

Out of the 198 patients studied, 127 patients were females constituting 64.1% of total whereas 71 patients were male constituting 35.9% of total. Male to female ratio is 1:1.7.

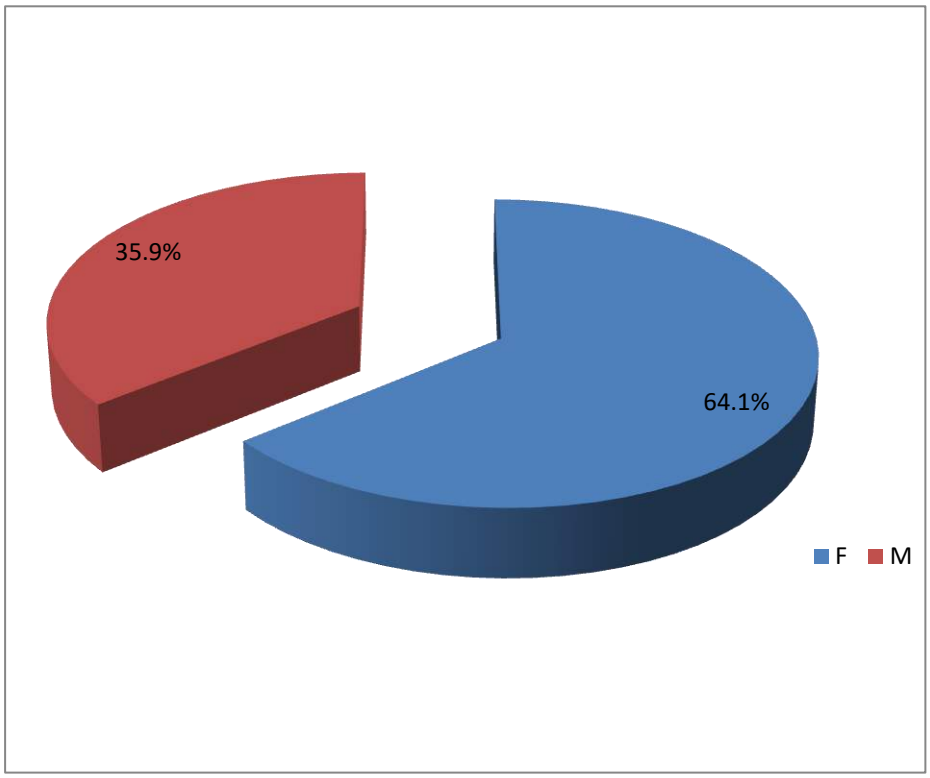


Figure 1: Sex distribution of patients

Table 2: Age distribution of patients

Age	No. of cases	Percentage
< 50	10	5.1%
51-60	70	35.4%
61-70	86	43.4%
>70	32	16.2%
Total	198	100.0%

Out of the total198 patients majority were in the age group of 61-70 year (86 patients, 43.4%), followed by 51-60 years (70 patients, 35.4%).The least number of patients were noted in the age group of <50 years (10 patients, 5.1%).(Table 2)

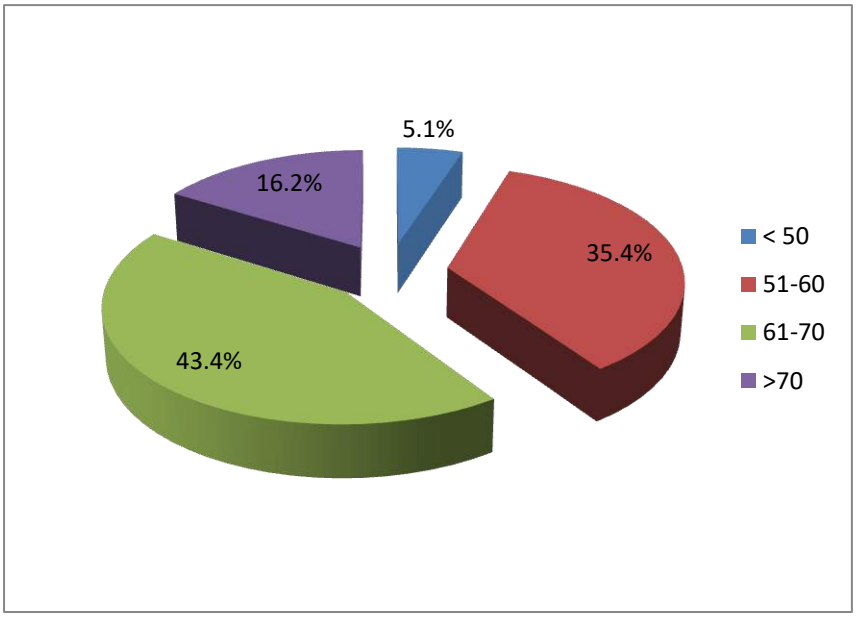


Figure 2: Age distribution of patients

Table 3: Distribution according to duration of osteoarthrithis

Duration OA(years)	No. of cases	Percentage
< 4	22	11.1%
5-8.0	154	77.8%
> 8	22	11.1%
Total	198	100.0%

More than one-half of patients had complaints for >5 years (5-8 years: 154 patients, 77.8% and >8 years 22 patients,11.1%) i.e. most patients who opted for surgery had chronic and disabling knee pain

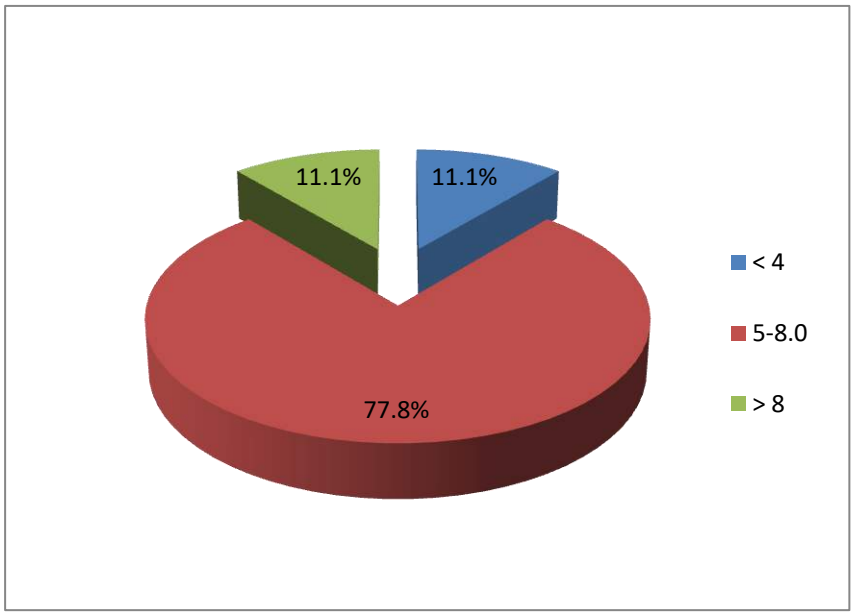


Figure 3: Distribution according to duration of osteoarthritis

Table 4: Distribution with respect to side operated

Side	No. of cases	Percentage
B/L	107	54.0%
L	49	24.7%
R	42	21.2%
Total	198	100.0%

107 patients (54%) underwent bilateral knee replacement, 49 patients (24.7%) with left side total knee replacement and 42 patients (21.2%) with right sided total knee replacement.

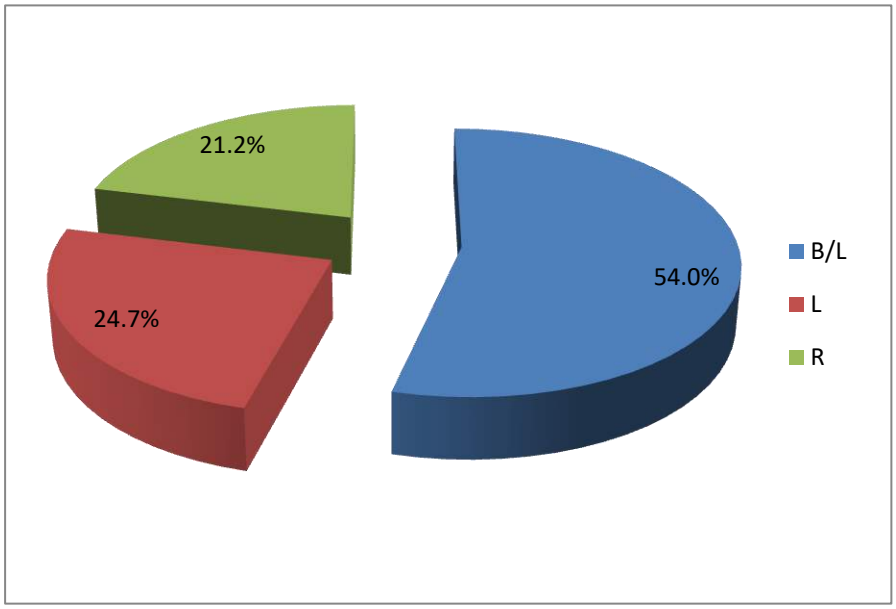


Figure 4: Distribution with respect to side operated

Table 5: Preoperative and postoperative WOMAC score, Right Side

	N	Minimum	Maximum	Mean	Std. Deviation
WOMAC Score pre op-Right side	149	68.0	92.0	82.4	4.6
WOMAC score post op Right side 0 week	149	58.0	88.0	71.9	6.7
WOMAC Score post op Right side 6 wks	149	8.0	54.0	20.9	7.8
WOMAC score Post op Right side 24 week	149	0.0	32.0	2.6	4.5

Mean Right side pre-op WOMAC score of patients was 82.4 (out of 198 patients) with a range of 68-92. Mean Right sided post op- WOMAC score at 0 week was 71.9 with a range of 58-88, at 6 weeks was 20.9 with a range of 8-54 and at 24 weeks was 2.6 with a range of 0-32.

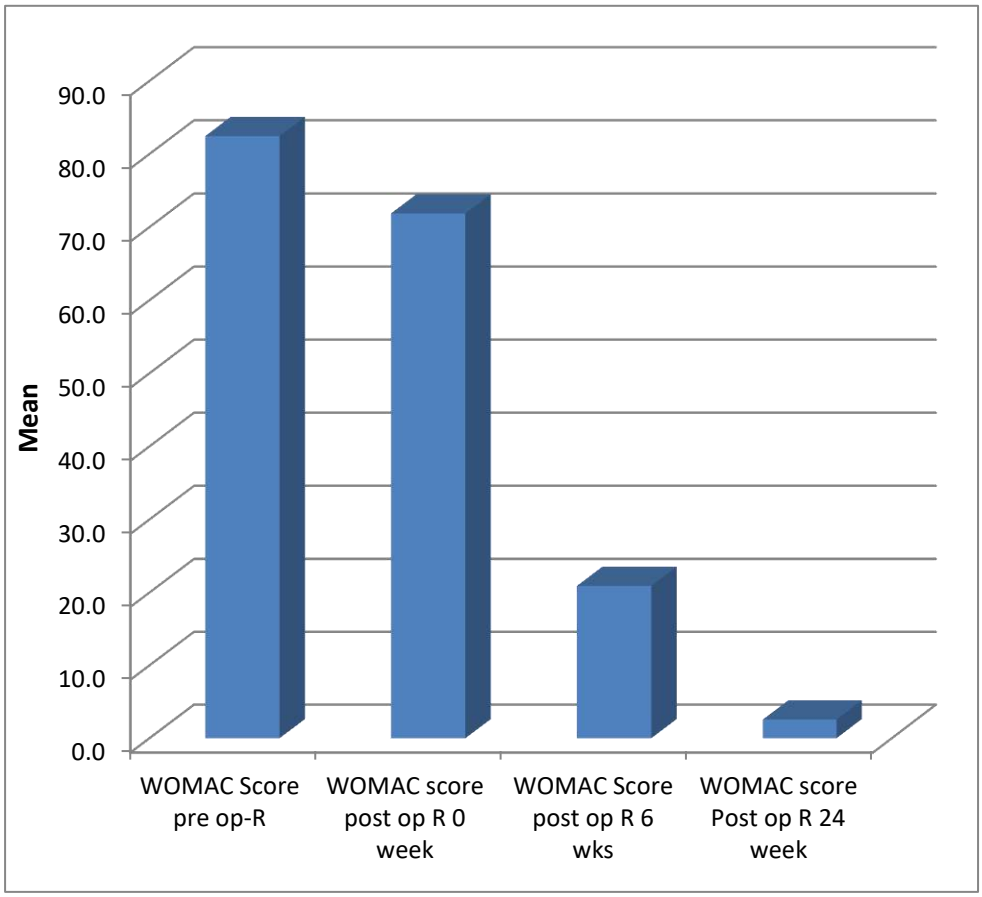


Figure 5: Preoperative and postoperative WOMAC score, Right Side

Table 6: Preoperative and post-operative VAS score, Right side

	N	Minimum	Maximum	Mean	Std. Deviation
VAS score Pre op Right side	149	7.0	10.0	8.6	0.7
VAS score post op Right side at 0 weeks	149	1.0	5.0	2.2	0.7
VAS Score post op Right side at 6 weeks	149	0.0	5.0	0.5	0.9
VAS score post op Right side at 24 week	149	0.0	5.0	0.5	0.8

Mean Right side pre-op VAS score of patients was 8.6 (out of 198 patients) with a range of 7-10. Mean Right sided post op- VAS score at 0 weeks was 2.2 with a range of 1-5, at 6 weeks was 0.5 with a range of 0-5 and at 24 weeks was 0.5 with a range of 0-5.

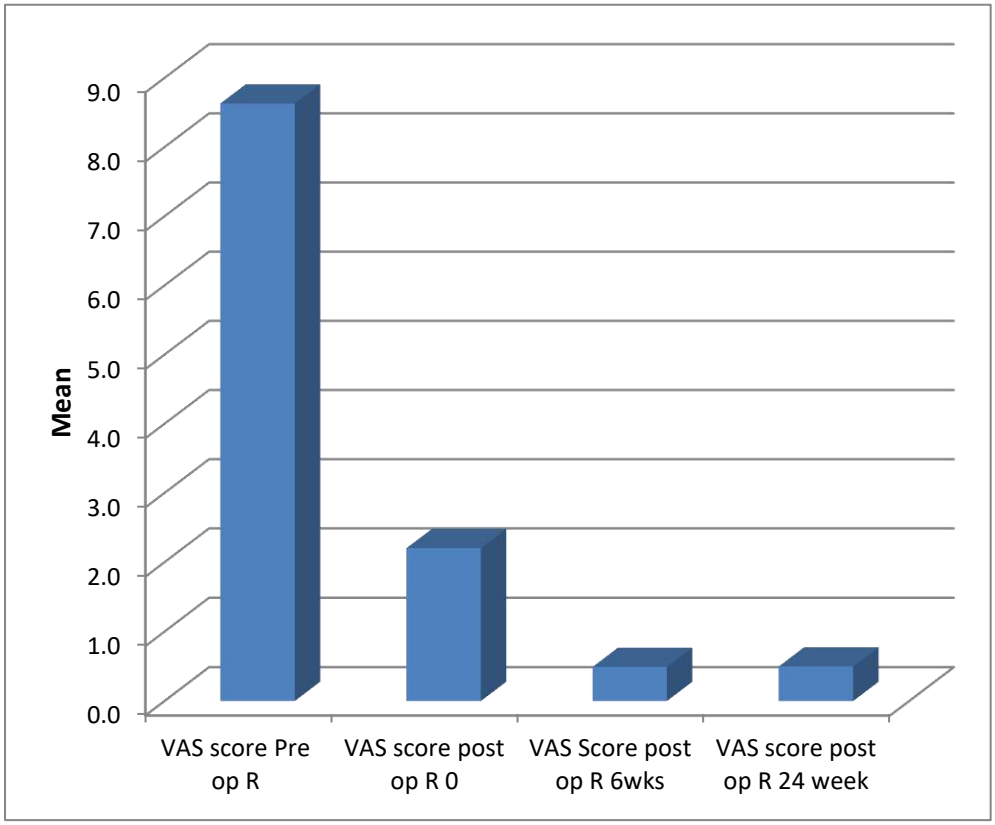


Figure 6: Preoperative and post-operative VAS score, Right side

Table 7: Preoperative and postoperative WOMAC score, Left Side

	N	Minimum	Maximum	Mean	Std. Deviation
WOMAC Score pre op –Left side	156	60.0	91.0	81.7	4.7
WOMAC Score postop Left side at 0 weeks	156	56.0	88.0	71.8	6.3
WOMAC Score post op Left side at 6weeks	156	8.0	42.0	20.8	7.5
WOMAC score Post op Left side at 24 week	156	0.0	16.0	2.1	3.5

Mean Left side pre-op WOMAC score of patients was 81.7 (out of 198 patients) with a range of 60-91. Mean Left sided post op- WOMAC score at 0 week was 71.8 with a range of 56-88, at 6 weeks was 20.8 with a range of 8-42 and at 24 weeks was 2.1 with a range of 0-16.

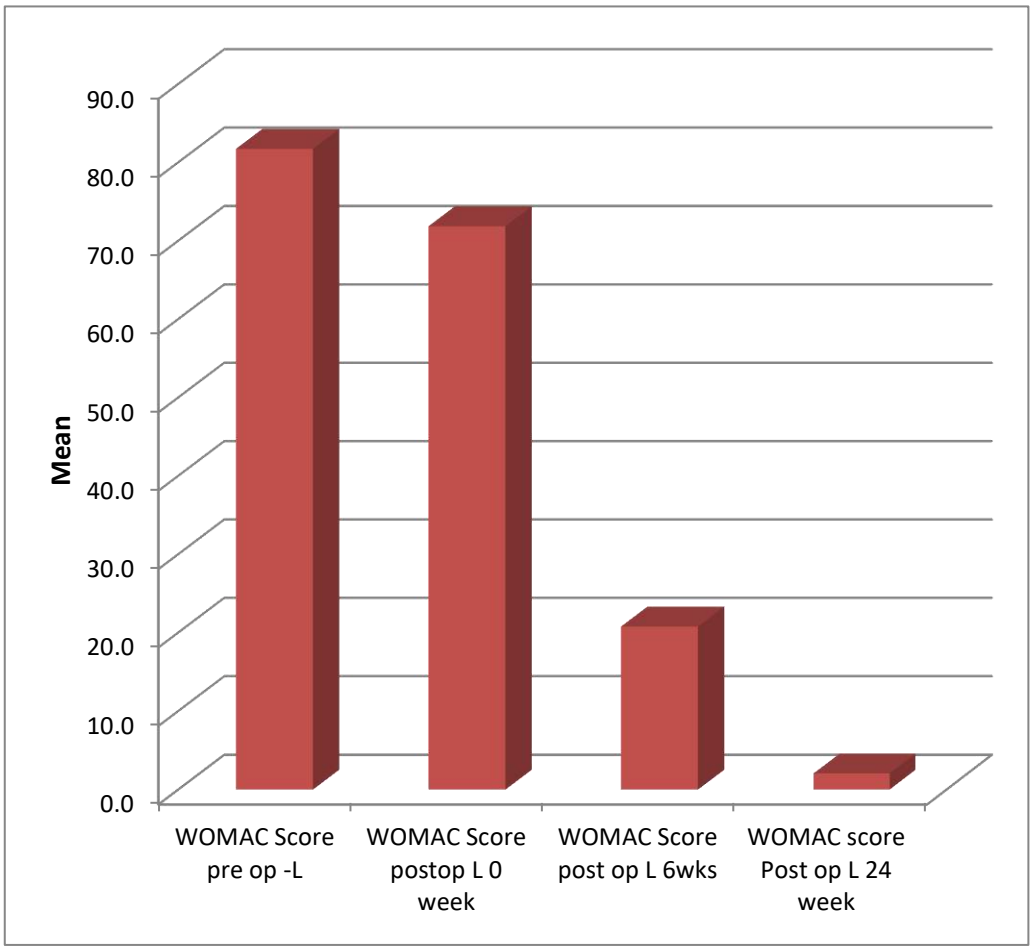


Figure 7: Preoperative and postoperative WOMAC score, Left Side

Table 8: Preoperative and post operative VAS score, Left side

	N	Minimum	Maximum	Mean	Std. Deviation
VAS score pre op Left side	156	5.0	10.0	8.4	0.9
VAS score post op Left side at 0 weeks	156	0.0	5.0	2.0	0.8
VAS score post op Left side at 6 weeks	156	0.0	3.0	0.3	0.6
VAS Score post op Left side at 24 week	156	0.0	3.0	0.3	0.6

Mean Left side pre-op VAS score of patients was 8.4 (out of 198 patients) with a range of 5-10. Mean Left sided post op- VAS score at 0 week was 2.0 with a range of 0-5, at 6 weeks was 0.3 with a range of 0-3 and at 24 weeks was 0.3 with a range of 0-3. (Table 8)

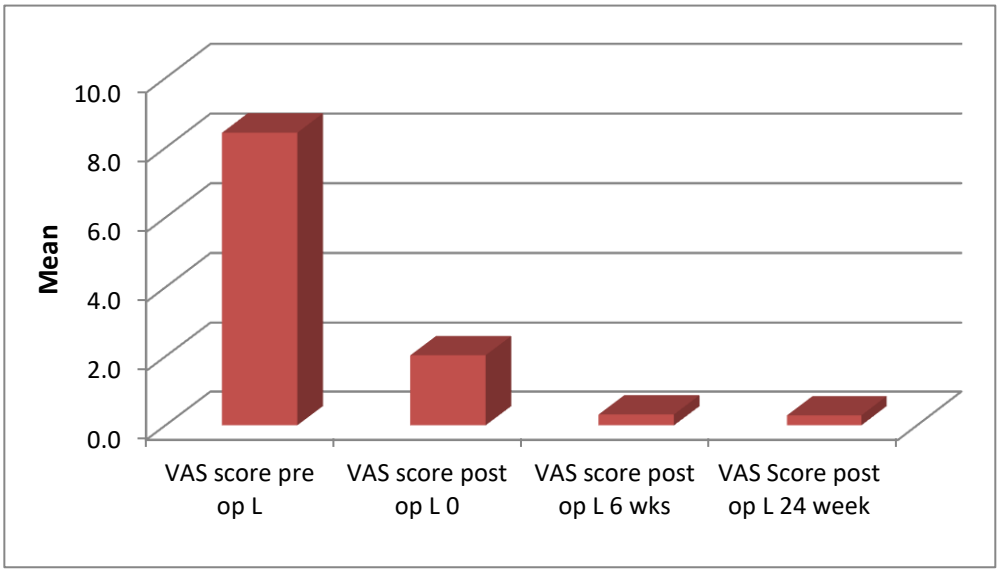


Figure 8: Preoperative and post operative VAS score, Left side

Table 9 : Intensity of Anterior knee pain – right side , VAS score

Intensity of pain	No of cases Pre-op	No. of cases Post –op at 24 weeks	Percentage
Mild	0	51	34.2 %
Moderate	0	1	0.7 %
Severe	149	0	0.0 %

VAS score : Mild pain 1-3 , Moderate pain 4-7 , severe pain 8-10

51 of total 149 patients with right sided TKR had mild anterior knee pain on VAS scale and only 1 patient had moderate anterior knee pain. 97 patients were having no anterior knee pain. All (149) the patients presented with severe knee pain pre operatively as scaled by VAS score.

Table 10 : Intensity of Anterior knee pain – left side , VAS score

Intensity of pain	No. of cases Pre-op	No of cases Post – op at 24 weeks	Percentage
Mild	0	36	24.2 %
Moderate	19	0	0.0 %
Severe	137	0	0.0 %

VAS score : Mild pain 1-3 , Moderate pain 4-7, severe pain 8-10

36 of total 156 patients with left sided TKR had mild anterior knee pain on VAS scale and none patient had moderate or severe anterior knee pain. 120 patients were having no anterior knee pain. Pre- operatively 19 patients had moderate knee pain and 137 patients had severe knee pain as scaled by VAS score.

Table 11: Complications in TKR

Knee infections	No. of cases	Left	Right	Bilateral
Superficial knee infection	3	1	2	-
Deep infection	1	1	0	-
Foot numbness	2	1	-	1
Expired	1	-	-	-

Out of 199 patients, one patient was expired and one patient developed knee joint infection which was successfully managed with wound lavage and change of spacer at 6 weeks but the patient had moderate pain at 6 months follow up while 2 patients developed superficial wound infection which were treated successfully with antiseptic dressing under observation and antibiotics. Two patients had foot numbness. One had bilateral foot numbess and the other had left foot numbness. One patient expired due to cardiovascular event.

DISCUSSION

The present study was conducted in the department of Orthopaedics, Dayanand Medical College and Hospital, Ludhiana over a period of 3 years from January 2016 to December 2018 (2 year retrospective and 1 year prospective). A total number of 199 cases of osteoarthritis were analyzed pre and post -operatively to evaluate anterior knee pain in total knee arthroplasty without patella resurfacing using WOMAC score and VAS score at pre-operation, 0 weeks, 6 weeks and 24 weeks after operation. After the TKA operation, participants showed significant improvement in WOMAC scores and VAS scores when compared to pre-operative scores. However, not all prognoses of patient with TKA are positive. Some patient with total knee arthroplasty show superficial and deep infection of knee, numbness of feet, little improvement in knee function after surgery and complaint of anterior knee pain difficulty in carrying out daily functional task. One patient was expired post-operatively due to cardio vascular event.

Osteoarthritis of the knee is a relatively prevalent condition that can progress to a point where it is debilitating. It adversely affects the patient's quality of life due to pain and decreased function. While there are many modes of treatment, including conservative and surgical management, the definitive method of treatment is joint replacement. This surgical procedure has become more common due to its effectiveness in alleviating pain and improving function, and will continue to play a key role in the management of osteoarthritis.[67] Expectation of complete pain relief after surgery was an independent predictor of better physical function and improvement in level of pain at 6 months post-surgery. We did retrospective and prospective study with total 199 patients, the age of oldest patient being 80 years and minimum age was 40 years. Mean age of patients enrolled in our study was 63.2 years. Mahomed et al (2002) [68] and Brander et al (2003) [69] conducted a study on patients undergoing TKR in which mean age was 66 years which is in concordance to our study. Choi et al [62] suggested that biological age, rather than chronological age, has a greater role in

determination of outcome after TKR. Sathiyanarayanan S [70]et al there was higher WOMAC score in people aged more than equal to 60 years (51.9%) compared to patients less than 60 years (27.5%) signifying increasing age to be a risk factor for Osteoarthritis.

More than one-half of patients in our study had complaints for >5 years (5-8 years: 77.8%and >8 years 11.1%) i.e. most patients who opted for surgery had chronic and disabling knee pain. It gives an impression that patients suffering from knee pain, especially in our part of world, cater to and exhaust all possible conservative modes of treatment before even thinking of surgery. Reasons for this may be the prevalent fear of undergoing surgery and financial constraints.

In Lingard et al [71](2004) study the mean age was 70 years and there were more number of female patients than male patients which is in concordance to our study in which Female to Male ratio is 1.7:1. Noble et al (2006) [72] reported that there was no correlation between genders which differs from our study. Zeni et al (2010) [73] concluded that improvements in function and long-term outcomes are similar in patients who undergo bilateral TKA and unilateral TKA which is also a finding similar to our study. Powell et al (2006) [74] concluded that patients with Bilateral TKR does not significantly different than unilateral TKA. Thus, it is immensely evident that there is no significant difference in patient satisfaction after unilateral and bilateral TKR.

In a study by Baumann et al.,[75] changes in knee pain was assessed using VAS score and there was significant pain reduction preoperatively which was 64.5 points to 15.4 points at six months .In a study by Jiyeon Lee et al [76] there was reduction in VAS score from 7 points preoperatively to 2.9 points postoperatively at 6 months. Our study is concordant to this study in which the mean Right side pre-op VAS score of patients was 8.6 .Mean Right sided post op- VAS score at 0 weeks was 2.2 , at 6 weeks was 0.5 and at 24 weeks was 0.5. Mean Left side pre-op VAS score of patients was 8.4. Mean Left sided post op- VAS score at 0 week was 2.0 , at 6 weeks was 0.3 and at 24 weeks was 0.3. This shows that there is significant reduction in post op VAS scores.

There are many tools to evaluate anterior knee pain, out of all OKS and WOMAC provides most comprehensive assessment of chronic pain according to study conducted by Vikki W et al [77].In our present study we are using VAS and WOMAC score. Budhiparama et al [78] did a retrospective cohort study in which WOMAC scores were improved significantly from mean of 70.25 to 33.36. In our study WOMAC score pre-operative was 81.7 and postoperatively at 24 weeks reduced to 2.05. According to Baker et al [79] WOMAC scores rose from 39.9 points before surgery to 77.7 points one year after surgery which is disconcordant to our study. According to Zoe H.et al [80] study conducted on total 204 patients there was significant improvement with WOMAC scores preoperatively 54.3 +/-14.4 to postoperatively14.5+/-12.1.In a study conducted by Ernest et al.,[81] mean of preoperative and postoperative WOMAC scores were calculated that is 35.52 preoperatively and 11.86 postoperatively. Brander et al [69]conducted a prospective, observational study assessing clinical and radiographic variables preoperatively and at 1, 3, 6 and 12 months after knee replacement for 116 patients (149 knees; mean age, 66 years; 55.2% women), significant pain was reported by 72.3%, 44.4%, 22.6%, 18.4%, and 13.1%, respectively which is in concordant to our study. Thambiah et al (2015) [67] showed that patient satisfaction is correlated with postoperative WOMAC function and final scores. Chi Jin et al [82] compared WOMAC score pre operatively and at 1months, 3 months and 6months the mean of which was 45.03 preoperatively and 32, 25 and 21.58 respectively postoperatively.

Yuan et al's[83] study, the complication rate in the present study was 14.6%, and the complications encountered included thrombotic events, cardiac problems and a single superficial wound infection. Ruban et al [84] reported a 14% rate of deep vein thrombosis following TKA (5% proximal and 9% distal thrombosis). In a study of Singaporean patients undergoing TKA, Nathan et al[85] reported a proximal deep venous thrombosis rate of 4.38%. In the present study, similar rates of deep vein thrombosis were observed (3.6% proximal and 5.5% distal deep vein thrombosis).In our study one patient had deep infection and 3

patients had superficial infection for which deep infection was treated with change of spacer and higher antibiotic. Superficial knee infection was treated with antiseptic dressing under observation and antibiotics. one patient was expired post operatively due to cardiovascular event. To prevent deep venous thrombosis, patients are treated with heparin prophylactically and given support stockings to wear. Patients are also given antibiotics for 24 hours after surgery to minimize the risk of infection.

William L Healy et al [86]studied the complications of TKA and adverse events include bleeding, wound complication, thromboembolic disease, neural deficit, vascular injury, medial collateral ligament injury, instability, malalignment, stiffness, deep joint infection, fracture, extensor mechanism disruption, patellofemoral dislocation, tibiofemoral dislocation, bearing surface wear, osteolysis, implant loosening, implant fracture/tibial insert dissociation, reoperation, revision, readmission, and death were found. Similarly in our present study complications that occurred were neural defecit, foot numbness, superficial and deep joint infection and death.

SUMMARY AND CONCLUSION

Total knee replacement being a high cost and high volume procedure, it becomes important to understand the response to the surgery. Many scores like WOMAC and VAS scores are used to evaluate this response.

Mean age of patients in our study was 63.2 years with a range of 45-80 years.

Out of the 198 patients studied, 127 patients were females whereas 71 patients were male. Male to female ratio is 1: 1.7.

107 patients underwent bilateral knee replacement without patellar resurfacing, 49 patients with left side total knee replacement and 42 patients with right sided total knee replacement. There was no significant difference in WOMAC and VAS scores of patients operated either unilateral or bilateral TKR.

More than one-half of patients in our study had complaints for >5 years (5-8 years: 77.8%and >8 years 11.1%) Most patients who opted for surgery had chronic and disabling knee pain and had higher pre-operative VAS score and WOMAC score as compared to other studies. It gives an impression that patients suffering from knee pain, especially in our part of world presented late and opted for surgery at advanced stage.

In the present study mean right side pre-op VAS score of anterior knee pain in patients was 8.6. Mean Right sided post op- VAS score of anterior knee pain without patellar resurfacing at 0 weeks was 2.2, at 6 weeks was 0.5 and at 24 weeks was 0.5. Mean Left side pre-op VAS score of knee pain in patients was 8.4. Mean Left sided post op- VAS score of anterior knee pain at 0 week was 2.0, at 6 weeks was 0.3 and at 24 weeks was 0.3. This shows that there is significant reduction in Anterior knee pain in post op VAS scores in TKR patients even without patellar resufacing.

Mean Right side pre-op WOMAC score of patients was 82.4 and mean right sided post op- WOMAC score at 0 week was 71.9, at 6 weeks

was 20.9 and at 24 weeks was 2.6.The mean WOMAC scores improved from preoperatively to postoperatively in TKR

Post operatively on VAS scale intensity of anterior knee pain was measured. 51 (34.2 %) of total 149 patients with right sided TKR without patellar resurfacing experienced mild anterior knee pain which did not limit daily activities and only 1 (0.6%) patient had moderate anterior knee pain. 97 patients had no anterior knee pain in non-patellar resurfacing. 36 (23 %) of total 156 patients with left sided TKR without patellar resurfacing had mild anterior knee pain which did not limit daily activities and none patient had moderate or severe anterior knee pain. 120 patients had no anterior knee pain. In one study 22 of 73 knees (30.1%) with patellar resurfacing and 18 of 86 knees (20.9%) without patellar resurfacing there was some degree of anterior knee pain ($p = 0.183$). which shows no statistical difference . The main concern of TKR without patellar resurfacing is incidence of anterior knee pain. Proponents of patella resurfacing group says that there is higher incidence of anterior knee pain in patients without patellar resurfacing but in our study it is seen that incidence of anterior knee pain is quiet low in patients without patellar resurfacing. The use of total knee replacement even without patellar resurfacing significantly improved the symptoms and functions which is evident from pre op & post op WOMAC and VAS scores. There by we can also avoid all the complications of patellar resurfacing.

Among 199 patients, 7 cases suffered from post-operative complications, including 3 cases of superficial wound infection which were managed successfully with extended antibiotic regimen and 1 case of deep joint infection which was managed successfully with change of spacer and Intravenous antibiotics. Two patients had foot numbness, one had bilateral foot numbess and the other had left foot numbness. One patient expired due to cardiovascular event. There was a low incidence of post-op complications in our patients highlighting the importance of a sterile OT environment, excellent skills and surgical technique, ergonomic implants and early and aggressive

rehabilitation protocol in making a surgery successful. There was no incidence of DVT among our patients which shows the importance of DVT prophylaxis measures like thromboembolic deterrent (TED) stockings, low molecular heparin or aspirin and early mobilization.

Hence we conclude that the incidence of anterior knee pain even without patellar resurfacing is quite low. In our study, we have shown that the incidence of anterior knee pain without patellar resurfacing is comparable to other national and international studies. So we recommend the total knee replacement without patellar resurfacing is beneficial as incidence of anterior knee pain is almost comparable with and without patellar resurfacing, where as the complications of patella resurfacing are higher.

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S.No.	MRD/CR No	Name	Age	Gender	DOA	DOD	Wgt	Du.OS	Dx	DOSx	Side	WOMAC Score pre op-R	WOMAC Score pre op -L	VAS score Pre op R	VAS score pre op L	WOMAC score post op R 0 week	WOMAC Score post op R 6 wks	WOMAC Score postop L 0 week	WOMAC Score post op L 6wks	VAS score post op R 0	post op R 6wks
1	448789	ND	64	F	28/2/18	5/3/2018	75	6	OA	8/3/2018	L	-	90	-	10	-	-	80	40	-	-
2	488220	NK	66	F	29/4/18	6/5/2018	70	5	OA	30/4/2018	B/L	88	80	7	6	70	30	64	28	3	1
3	435839	IK	59	F	9/2/2018	16/2/2018	77	5	OA	10/2/2018	B/L	80	84	8	9	68	28	70	18	3	0
4	439571	SK	56	F	14/2/18	21/2/2018	74	3	OA	15/2/2018	B/L	84	76	9	8	77	16	70	16	3	1
5	431871	PK	51	F	2/2/2018	9/2/2018	72	4	OA	3/2/2018	B/L	72	76	9	9	70	22	72	24	4	0
6	220493	RK	59	F	3/4/2018	9/4/2018	78	7	OA	4/4/2018	L	-	77	-	9	-	-	68	34	-	-
7	428588	MS	68	M	28/6/18	4/7/2018	77	5	OA	29/6/2018	B/L	80	60	8	5	78	40	56	21	3	2
8	523906	PK	66	F	21/6/18	27/6/2018	79	6	OA	22/6/2018	L	-	84	-	7	-	-	70	29	-	-
9	448532	BR	50	M	8/3/2018	15/3/2018	82	4	OA	9/3/2018	B/L	80	76	8	7	75	30	70	30	2	1
10	446352	BS	62	M	18/3/18	24/3/2018	77	7	OA	19/3/2018	B/L	76	73	8	7	70	8	66	10	1	1
11	491091	JD	68	F	3/5/2018	10/5/2018	80	5	OA	4/5/2018	B/L	68	80	8	6	60	18	72	22	1	0
12	8935	NL	65	M	12/3/2018	17/3/2018	72	6	OA	13/3/2018	R	80	-	8	-	77	28	-	-	2	1
13	444220	BS	63	M	7/3/2018	12/3/2018	89	3	OA	8/3/2018	R	76	-	8	-	70	31	-	-	1	0
14	524100	SK	67	F	21/6/18	28/6/2018	76	7	OA	22/6/2018	B/L	80	78	8	7	74	18	70	12	2	0
15	446552	DS	72	M	26/2/18	4/3/2018	82	8	OA	27/2/2018	B/L	84	80	9	8	80	30	77	24	4	2
16	462355	HK	61	F	20/3/18	27/3/2018	77	4	OA	21/3/2018	B/L	88	84	9	8	84	23	70	20	3	2
17	459586	BS	80	M	19/3/18	25/3/2018	84	8	OA	20/3/2018	L	-	76	-	7	-	-	72	16	-	-
18	490367	SC	65	F	7/5/2018	14/5/2018	76	5	OA	8/3/2018	B/L	84	88	9	9	80	12	84	16	2	0
19	426944	RJ	47	F	24/1/18	31/1/2018	68	5	OA	25/1/2018	B/L	88	85	9	10	85	22	76	17	3	2
20	228533	RK	58	F	28/5/18	3/6/2018	66	7	OA	29/5/2018	B/L	88	80	8	6	83	11	79	15	2	0
21	504641	RS	58	M	25/5/18	31/5/2018	90	4	OA	26/5/2018	L	-	84	-	7	-	-	78	9	-	-
22	504936	SK	70	F	23/5/18	29/5/2018	89	6	OA	24/5/2018	L	-	76	-	7	-	-	71	8	-	-
23	493352	KR	64	F	7/5/2018	14/5/2018	79	3	OA	8/5/2018	B/L	80	76	8	7	78	17	69	13	2	1
24	504594	SJ	54	F	23/5/18	29/5/2018	69	2	OA	24/5/2018	B/L	84	88	8	7	80	26	85	30	1	0
25	490230	NJ	50	F	2/5/2018	8/5/2018	71	5	OA	3/5/2018	B/L	86	76	9	8	83	18	72	10	3	1
26	466060	PK	62	F	9/4/2018	15/4/2018	73	4	OA	10/4/2018	B/L	80	76	9	7	75	19	69	15	2	1
27	247231	TR	59	F	23/4/18	27/4/2018	73	4	OA	24/4/2018	L	-	88	-	8	-	-	80	19	-	-
28	492303	G	58	F	16/7/18	22/7/2018	67	6	OA	17/7/2018	B/L	88	84	9	7	83	50	79	35	3	5
29	515719	CD	58	F	8/6/2018	14/6/2018	78	3	OA	9/6/2018	B/L	78	82	7	8	70	22	77	25	1	1
30	465952	N	53	F	26/3/18	1/4/2018	89	6	OA	27/3/2018	B/L	76	72	9	8	66	27	70	23	2	1
31	454885	JR	55	F	16/3/18	23/3/18	66	5	OA	17/3/2018	B/L	84	88	9	8	77	25	80	30	2	1
32	428947	VD	70	F	29/1/18	4/2/2018	89	6	OA	30/1/2018	B/L	92	84	9	7	88	54	80	38	3	3
33	22825	TK	67	F	14/2/18	20/2/18	77	6	OA	15/2/2018	B/L	80	76	8	7	72	26	64	18	2	1
34	451885	AR	57	F	12/3/2018	17/3/18	77	4	OA	13/3/2018	L	-	80	-	8	-	-	77	22	-	-
35	426940	SK	70	F	24/1/18	29/1/18	70	8	OA	25/1/2018	L	-	88	-	9	-	-	80	32	-	-
36	499660	NK	80	F	4/6/2018	9/6/2018	65	8	OA	5/6/2018	L	-	84	-	9	-	-	80	21	-	-
37	562431	PG	78	M	17/8/18	25/8/18	80	6	OA	18/8/2018	B/L	86	84	9	9	80	22	72	20	1	1
38	567491	RK	54	F	24/8/18	3/9/2018	71	5	OA	25/8/2018	B/L	88	82	8	9	86	25	79	20	2	2
39	474967	RN	56	F	24/4/18	-	70	6	OA	25/4/2018	B/L	88	76	9	8	80	33	70	23	2	1
40	141638	PC	71	M	12/3/2018	-	77	5	OA	13/3/2018	R	80	-	8	-	76	28	-	-	2	0
41	528315	SS	53	F	28/6/18	-	90	4	OA	29/6/2018	R	88	-	9	-	80	37	-	-	3	2
42	340505	SB	60	M	3/9/2017	7/9/2017	75	7	OA	4/9/2017	L	-	85	-	8	-	-	80	16	-	-
43	547513	DS	80	M	19/12/18	24/12/18	78	8	OA	20/12/2018	L	-	86	-	9	-	-	80	15	-	-
44	637097	SK	65	F	13/12/18	20/12/18	69	6	OA	14/12/2018	R	80	-	9	-	77	14	-	-	2	0
45	607621	SD	67	F	24/10/18	29/10/18	73	7	OA	25/10/2018	L	-	79	-	8	-	-	75	28	-	-
46	624965	RC	67	M	23/11/18	29/11/18	76	9	OA	24/11/2018	R	76	-	9	-	71	32	-	-	4	3
47	20204	SS	56	M	21/11/18	27/11/18	65	6	OA	22/11/2018	B/L	87	83	8	8	80	16	77	15	2	0
48	558582	DM	64	M	3/9/2018	9/9/2018	73	9	OA	4/9/2018	B/L	80	84	8	9	77	30	80	28	2	1
49	578518	AT	55	M	12/9/2018	17/9/18	67	6	OA	13/9/2018	L	-	85	-	8	-	-	80	20	-	-
50	575591	GK	73	F	3/10/2018	8/10/2018	63	10	OA	4/10/2018	R	82	-	9	-	76	18	-	-	2	0
51	241022	JS	71	M	10/10/2018	18/10/18	77	11	OA	11/10/2018	R	85	-	8	-	68	38	-	-	1	1
52	637269	GK	69	M	19/12/18	24/12/18	78	8	OA	20/12/2018	R	88	-	9	-	69	29	-	-	4	2
53	530069	ST	80	M	5/9/2018	13/9/18	72	10	OA	6/9/2018	L	-	87	-	9	-	-	78	31	-	-

S.No.	MRD/CR No	Name	Age	Gender	DOA	DOD	Wgt	Du.OS	Dx	DOSx	Side	WOMAC Score pre op-R	WOMAC Score pre op -L	VAS score Pre op R	VAS score pre op L	WOMAC score post op R 0 week	WOMAC Score post op R 6 wks	WOMAC Score postop L 0 week	WOMAC Score post op L 6wks	VAS score post op R 0	post op R 6wks
54	401789	HK	58	F	18/4/18	23/4/18	61	5	OA	19/4/2018	L	-	87	-	9	-	-	60	17	-	-
55	496705	SB	63	M	4/6/2018	9/6/2018	69	8	OA	5/4/2018	R	86	-	9	-	75	19	-	-	2	1
56	530444	SC	59	F	2/7/2018	9/7/2018	63	6	OA	3/7/2018	B/L	80	87	9	8	70	22	80	18	1	0
57	541066	RK	76	F	18/7/19	23/7/18	74	11	OA	19/7/2018	R	86	-	9	-	80	26	-	-	2	0
58	546341	PD	63	F	25/7/18	31/7/18	77	8	OA	26/7/2018	B/L	90	80	10	9	80	30	77	22	2	0
59	635083	RR	68	M	10/12/2018	15/12/18	82	9	OA	11/12/2018	L	-	90	-	10	-	-	70	30	-	-
60	576487	JS	-	M	12/9/2018	19/9/18	78	5	OA	13/9/2018	B/L	88	80	9	8	77	20	70	18	2	1
61	522349	NR	60	F	19/9/18	24/9/18	63	6	OA	20/9/2018	L	-	86	-	8	-	-	78	28	-	-
62	463300	R	62	M	21/3/18	27/3/18	76	7	OA	22/3/2018	B/L	90	80	10	8	80	40	68	20	3	0
63	255418	KJ	58	F	1/5/2017	7/5/2017	69	7	OA	2/5/2017	B/L	76	80	9	8	69	20	70	18	1	0
64	282989	KR	60	F	23/6/17	28/6/17	72	6	OA	24/6/2017	L	-	82	-	8	-	-	77	25	-	-
65	322470	SD	74	F	9/8/2017	16/8/17	70	8	OA	11/7/2017	B/L	90	91	10	10	86	38	88	39	2	1
66	344619	DS	60	M	13/9/17	20/9/17	76	7	OA	14/9/2017	B/L	73	79	7	8	66	28	60	29	1	0
67	378079	PK	62	F	30/10/17	6/11/2017	67	6	OA	31/10/2017	B/L	82	77	8	7	72	20	67	20	2	0
68	55505	PR	52	F	5/10/2017	13/10/17	61	5	OA	6/10/2017	B/L	89	86	9	8	68	28	79	30	1	0
69	401823	AP	65	M	20/12/17	29/12/17	75	8	OA	21/12/2017	B/L	88	82	9	8	80	40	75	29	1	1
70	327690	NK	70	F	1/9/2017	7/9/2017	73	10	OA	2/9/2017	B/L	79	85	8	7	70	18	77	30	2	1
71	351694	ML	62	M	3/10/2017	10/10/2017	83	7	OA	4/10/2017	B/L	80	77	8	9	70	28	70	33	2	0
72	225702	JK	65	F	17/4/17	26/4/17	69	8	OA	18/4/2017	B/L	75	78	7	8	70	29	72	38	1	0
73	196773	GK	58	F	15/2/17	21/2/17	76	5	OA	16/2/2017	R	83	-	8	-	77	18	-	-	2	0
74	364445	KK	66	F	29/11/17	5/12/2017	78	4	OA	30/11/2017	B/L	89	77	7	8	86	28	70	26	2	0
75	277095	RK	68	F	31/5/17	7/6/2017	88	4	OA	1/6/2017	B/L	90	87	10	9	88	26	86	22	1	0
76	32616	JK	65	F	29/2/16	6/3/2016	89	5	OA	1/3/2016	L	-	85	-	8	-	-	80	38	-	-
77	68490	MK	63	F	9/1/2017	14/1/17	78	3	OA	10/1/2017	L	-	87	-	9	-	-	84	28	-	-
78	390998	HS	79	M	8/12/2017	13/12/17	88	6	OA	9/12/2017	L	-	88	-	10	-	-	80	40	-	-
79	332170	S	78	F	21/8/17	27/8/17	90	8	OA	22/8/2017	R	88	-	9	-	80	33	-	-	2	0
80	141553	KK	62	F	29/8/16	5/9/2016	89	5	OA	30/8/2016	L	-	82	-	10	-	-	78	42	-	-
81	228521	RG	77	M	24/3/17	29/3/17	87	10	OA	25/3/2017	L	-	86	-	9	-	-	80	28	-	-
82	280065	MK	62	F	5/6/2017	12/6/2017	90	5	OA	6/6/2017	B/L	76	82	8	9	78	30	79	32	2	0
83	288222	SL	40	M	16/6/17	23/6/17	88	4	OA	17/6/2017	B/L	78	80	8	9	70	20	72	28	1	0
84	340925	RG	51	F	4/9/2017	12/9/2017	79	5	OA	5/9/2017	B/L	76	82	8	9	68	16	69	20	3	0
85	345898	RG	52	F	22/12/17	30/12/17	89	4	OA	23/12/2017	B/L	87	82	9	8	80	38	79	30	3	2
86	303680	UR	73	F	10/7/2017	17/7/17	88	10	OA	11/7/2017	B/L	80	88	8	9	68	18	80	36	2	0
87	310118	JS	66	M	27/12/17	1/1/2018	90	6	OA	28/12/2017	B/L	87	80	9	8	79	30	70	18	2	1
88	394708	DR	58	F	1/12/2017	7/12/2017	87	5	OA	2/12/2017	B/L	84	86	7	8	77	20	80	38	2	0
89	146716	H	77	M	12/9/2016	17/9/16	90	10	OA	13/9/2016	L	-	84	-	10	-	-	77	32	-	-
90	608426	BS	63	M	6/12/2018	11/12/2018	80	4	OA	7/12/2018	L	-	77	-	8	-	-	67	32	-	-
91	353531	RK	67	M	28/4/17	5/5/2017	78	6	OA	29/4/2017	R	74	-	8	-	68	12	-	-	2	0
92	191516	PK	62	F	31/1/17	6/2/2017	88	5	OA	1/2/2017	R	77	-	8	-	70	13	-	-	3	0
93	288219	VK	65	M	22/6/17	28/6/17	77	5	OA	23/6/2017	R	83	-	9	-	78	24	-	-	3	0
94	269801	SG	67	F	21/5/17	27/5/17	88	7	OA	22/5/2017	B/L	84	86	9	9	80	12	78	12	2	0
95	256086	RK	49	F	8/5/2017	15/5/17	78	4	OA	9/5/2017	B/L	86	87	8	8	79	11	80	14	3	0
96	266873	NK	76	F	22/5/17	27/5/17	70	7	OA	23/5/2017	L	-	85	-	9	-	-	78	20	-	-
97	258072	DK	57	F	12/5/2017	18/5/17	72	5	OA	13/5/2017	L	-	86	-	9	-	-	76	23	-	-
98	299959	GK	80	F	4/7/2017	9/7/2017	78	8	OA	5/7/2017	R	88	-	9	-	78	28	-	-	2	1
99	289610	MB	51	F	19/6/17	24/6/17	70	5	OA	20/6/2017	L	-	83	-	9	-	-	75	18	-	-
100	276370	SR	57	F	30/5/17	4/6/2017	68	5	OA	31/5/2017	B/L	80	82	7	8	70	14	77	12	2	0
101	245559	GL	61	M	17/4/17	23/4/17	77	6	OA	18/4/2017	B/L	84	88	8	9	77	12	78	13	2	0
102	292456	SK	70	F	23/6/17	29/6/17	70	8	OA	24/6/2017	B/L	87	80	9	8	79	30	70	18	3	1
103	263370	BS	65	M	2/6/2017	8/6/2017	69	5	OA	3/6/2017	B/L	80	82	9	9	67	20	70	18	2	0
104	308420	RS	64	M	26/7/17	31/7/17	80	6	OA	27/7/2017	L	-	85	-	9	-	-	80	20	-	-
105	291481	M	74	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
106	329124	SK	59	F	18/8/18	24/817	76	5	OA	19/8/2017	B/L	87	90	9	10	77	20	78	18	2	0

S.No.	MRD/CR No	Name	Age	Gender	DOA	DOD	Wgt	Du.OS	Dx	DOSx	Side	WOMAC Score pre op-R	WOMAC Score pre op -L	VAS score Pre op R	VAS score pre op L	WOMAC score post op R 0 week	WOMAC Score post op R 6 wks	WOMAC Score postop L 0 week	WOMAC Score post op L 6wks	VAS score post op R 0	post op R 6wks
107	330952	BM	55	M	21/8/17	26/8/17	69	5	OA	22/8/2017	R	87	-	8	-	67	10	-	-	3	0
108	211242	AD	56	F	30/8/17	4/9/2017	60	6	OA	31/8/2017	B/L	84	86	9	9	70	20	78	22	2	0
109	342596	SJ	66	F	6/9/2017	11/9/2017	60	5	OA	7/9/2017	R	86	-	9	-	78	17	-	-	2	0
110	308308	JK	67	F	17/7/17	24/7/17	78	4	OA	18/7/2017	B/L	80	84	8	9	70	18	77	28	3	0
111	322554	MS	66	M	6/8/2017	11/8/2017	69	5	OA	7/8/2017	L	-	88	-	9	-	-	78	19	-	-
112	346357	DJ	61	F	11/9/2017	18/9/17	65	6	OA	12/9/2017	B/L	81	79	8	9	70	15	60	12	2	0
113	290819	MK	75	F	21/6/17	28/6/17	60	8	OA	22/6/2017	B/L	86	87	9	9	78	20	75	28	2	1
114	383831	HK	48	F	7/11/2017	12/11/2017	62	4	OA	8/11/2017	B/L	88	80	9	9	67	18	60	16	2	0
115	390784	S	60	F	4/12/2017	10/12/2017	66	6	OA	5/12/2017	B/L	82	80	9	8	70	30	69	18	3	0
116	362018	GS	62	M	11/10/2017	16/10/17	68	5	OA	12/10/2017	L	-	88	-	9	-	-	70	22	-	-
117	383074	NK	72	F	6/11/2017	12/11/2017	66	6	OA	7/11/2017	B/L	80	84	9	9	70	16	72	24	2	0
118	354440	SK	60	F	22/9/17	27/9/17	69	6	OA	23/9/2017	B/L	86	80	9	8	64	12	66	12	2	0
119	46789	JK	62	F	27/9/17	3/9/2017	72	5	OA	28/9/2017	B/L	84	86	9	9	70	22	72	28	2	0
120	358845	SL	44	F	4/10/2017	10/10/2017	74	5	OA	5/10/2017	B/L	80	89	10	9	70	18	68	12	2	0
121	362014	SS	68	M	11/10/2017	16/10/17	68	6	OA	12/10/2017	L	-	80	-	9	-	-	64	12	-	-
122	411681	KK	52	F	27/12/17	7/12/2017	63	5	OA	28/12/2017	B/L	86	84	8	9	64	12	60	10	2	0
123	390648	BS	63	M	6/12/2017	11/12/2017	67	5	OA	7/12/2017	R	88	-	9	-	70	14	-	-	2	0
124	406584	DD	60	F	20/12/17	26/12/17	78	6	OA	21/12/2017	B/L	89	87	9	9	70	16	72	14	3	0
125	409942	BS	71	M	25/12/17	31/12/17	68	8	OA	26/12/2017	R	88	-	9	-	64	12	-	-	2	0
126	374301	HK	72	F	24/10/17	29/10/17	64	7	OA	25/10/2017	L	-	80	-	9	-	-	62	14	-	-
127	253290	AS	65	M	4/2/2016	11/2/2016	60	5	OA	5/2/2016	L	-	88	-	9	-	-	70	18	-	-
128	13543	KN	59	M	21/1/16	27/1/16	68	5	OA	22/1/2016	B/L	88	80	9	9	70	20	64	16	2	0
129	3827	SK	52	F	24/1/16	29/1/16	69	5	OA	25/1/2016	L	-	88	-	9	-	-	70	18	-	-
130	34736	UR	55	F	18/2/16	25/2/16	73	6	OA	19/2/2016	B/L	82	82	9	9	70	12	72	16	2	0
131	38452	VS	69	F	23/2/16	29/2/16	75	6	OA	24/2/2016	R	86	-	9	-	62	12	-	-	2	0
132	122226	JS	72	M	7/2/2016	14/2/16	68	5	oA	8/2/2016	L	-	88	-	9	-	-	68	12	-	-
133	33686	MB	77	M	18/2/16	25/2/16	70	6	oA	19/2/2016	R	84	-	9	-	68	16	-	-	3	0
134	41262	RK	65	F	26/2/16	4/3/2016	68	5	OA	27/2/2016	B/L	80	84	9	9	68	18	70	22	2	0
135	49026	JS	68	M	6/3/2016	12/3/2016	70	6	OA	7/3/2016	B/L	88	80	9	9	70	18	68	12	2	0
136	49599	SK	55	F	7/3/2016	13/3/16	68	5	OA	8/3/2016	B/L	86	80	9	9	76	18	70	16	3	0
137	49747	GS	65	M	7/3/2016	13/3/16	62	5	oA	8/3/2016	B/L	80	84	9	9	70	18	72	20	2	0
138	78089	MS	80	M	8/4/2016	15/4/16	79	8	OA	9/4/2016	B/L	82	86	10	10	73	20	75	22	-	-
139	269340	KM	65	M	8/4/2016	13/4/2016	65	6	OA	9/4/2016	R	86	-	9	-	66	17	64	18	3	0
140	78463	SS	52	M	8/4/2016	13/4/16	73	8	OA	9/4/2016	L	-	84	-	9	-	-	63	16	-	-
141	122364	SS	68	M	10/4/2016	15/4/16	70	7	OA	11/4/2016	R	85	-	8	-	70	15	-	-	2	0
142	76009	HS	67	M	11/4/2016	16/4/16	76	7	OA	12/4/2016	R	84	-	8	-	62	12	-	-	2	0
143	82874	RI	79	M	14/4/16	19/4/16	65	7	OA	15/4/2016	R	88	-	9	-	73	18	-	-	3	1
144	75065	SS	65	F	19/4/16	24/4/16	63	8	OA	20/4/2016	R	86	-	9	-	75	13	-	-	2	0
145	90061	GK	60	F	25/4/16	1/5/2016	65	7	OA	26/4/2016	B/L	83	85	8	9	69	12	70	17	2	0
146	45763	AS	65	M	27/4/2016	1/5/2016	74	7	OA	28/4/2016	R	86	-	9	-	76	16	-	-	2	0
147	95599	HK	70	F	29/4/16	6/5/2016	61	9	OA	30/4/2016	B/L	85	81	9	8	77	15	71	11	3	1
148	88714	GK	73	F	22/4/16	28/4/16	69	8	OA	23/4/2016	B/L	84	87	9	9	77	14	81	17	2	0
149	98081	SK	68	F	3/5/2016	9/5/2016	67	8	OA	4/5/2016	B/L	88	86	9	9	68	18	66	16	2	0
150	80797	PS	65	F	3/5/2016	8/5/2016	68	9	OA	4/5/2016	R	79	-	9	-	62	14	-	-	1	0
151	91401	BK	58	F	6/5/2016	13/5/16	65	8	OA	7/5/2016	B/L	78	81	8	9	61	16	65	20	3	1
152	85133	PS	67	M	10/5/2016	17/5/16	76	10	OA	11/5/2016	B/L	79	83	9	8	64	14	66	18	3	1
153	110821	NP	60	F	23/5/16	28/5/16	70	8	OA	24/5/2016	L	-	80	-	8	-	-	-	-	-	-
154	109191	BS	80	M	18/5/16	23/5/16	74	10	OA	19/5/2016	R	87	-	10	-	63	15	-	-	5	4
155	108264	DK	60	F	17/5/16	23/5/16	66	7	OA	18/5/2016	R	77	-	8	-	67	20	-	-	2	0
156	114207	BK	60	F	31/5/16	7/6/2016	76	9	OA	1/6/2016	B/L	74	79	8	8	64	14	69	19	2	0
157	115228	BR	70	F	6/6/2016	13/6/16	76	9	OA	7/6/2016	R	78	-	9	-	58	22	-	-	3	2
158	117038	RS	46	F	10/6/2016	17/6/16	69	7	OA	11/6/2016	B/L	86	82	9	9	78	16	72	14	2	0
159	119685	KR	61	F	20/6/16	27/6/16	72	8	OA	21/6/2016	B/L	80	83	9	9	68	18	70	23	2	0

S.No.	MRD/CR No	Name	Age	Gender	DOA	DOD	Wgt	Du.OS	Dx	DOSx	Side	WOMAC Score pre op-R	WOMAC Score pre op -L	VAS score Pre op R	VAS score pre op L	WOMAC score post op R 0 week	WOMAC Score post op R 6 wks	WOMAC Score postop L 0 week	WOMAC Score post op L 6wks	VAS score post op R 0	post op R 6wks
160	120338	JS	72	M	22/6/16	29/6/16	79	8	OA	23/6/2016	B/L	77	80	9	9	66	15	72	20	2	0
161	121591	MK	58	F	27/6/16	3/7/2016	66	8	OA	28/6/2016	B/L	82	80	9	9	60	22	66	20	2	0
162	123761	PK	45	F	5/7/2016	13/7/16	60	7	OA	6/7/2016	B/L	78	83	9	9	60	18	62	16	3	0
163	123961	PG	68	M	6/7/2016	12/7/2016	78	9	OA	7/7/2016	R	85	-	8	-	63	15	-	-	2	0
164	130590	RK	56	F	27/7/16	3/8/2016	69	8	OA	28/7/2016	B/L	83	80	9	8	72	22	70	20	2	0
165	131920	NK	56	F	31/7/16	6/8/2016	73	7	OA	1/8/2016	B/L	85	83	9	9	65	15	64	13	2	0
166	132264	AS	70	M	1/8/2016	6/8/2016	76	8	OA	2/8/2016	R	77	-	8	-	61	17	-	-	2	0
167	132739	HK	57	F	2/8/2016	7/8/2016	69	7	OA	3/8/2016	L	-	84	-	9	-	-	66	14	-	-
168	132888	K	68	F	3/8/2016	9/8/2016	74	8	OA	4/8/2016	B/L	79	77	9	8	64	16	62	13	2	0
169	139570	MJ	66	F	8/8/2016	14/8/16	71	9	OA	9/8/2016	B/L	78	75	9	8	67	17	65	15	1	0
170	134995	SG	66	F	9/8/2016	14/8/16	59	7	OA	10/8/2016	L	-	76	-	8	-	-	63	12	-	-
171	139156	CK	57	F	22/8/16	28/8/16	60	6	OA	23/8/2016	B/L	80	76	9	8	62	20	66	17	3	1
172	139099	RM	66	M	22/8/16	28/8/16	66	8	OA	23/8/2016	L	-	74	-	8	-	-	69	15	-	-
173	143042	RR	68	M	2/9/2016	8/9/2016	69	7	OA	3/9/2016	B/L	83	80	9	9	72	22	70	19	2	0
174	110207	BR	58	F	8/9/2016	13/9/16	69	5	OA	9/9/2016	L	-	76	-	8	-	-	67	17	-	-
175	148703	KS	65	F	12/9/2016	18/9/16	73	8	OA	13/9/2016	B/L	79	77	9	8	70	18	73	16	2	0
176	147528	SL	57	F	14/9/16	20/9/16	71	7	OA	15/9/2016	B/L	74	76	9	9	65	13	66	16	2	0
177	149365	KK	56	F	19/9/16	24/9/16	67	6	OA	20/9/2016	L	-	81	-	8	-	-	72	13	-	-
178	149376	KM	59	F	22/9/16	28/9/16	78	7	OA	23/9/2016	B/L	80	82	8	9	70	22	71	23	2	0
179	151786	SS	68	M	27/9/16	2/10/2016	74	6	OA	28/9/2018	R	82	-	8	-	64	21	-	-	3	0
180	119912	BR	56	M	29/9/16	4/10/2016	69	7	OA	30/9/2016	L	-	76	-	8	-	-	64	15	-	-
181	129070	GS	64	M	9/10/2016	13/10/16	80	9	OA	10/10/2016	L	-	78	-	9	-	-	66	16	-	-
182	155345	JS	80	M	14/10/16	18/10/16	73	7	OA	15/10/2016	R	81	-	9	-	70	20	-	-	3	2
183	46018	PK	54	F	17/10/19	23/10/19	68	9	OA	18/10/2016	B/L	78	75	9	9	69	18	67	15	2	1
184	133216	PK	57	F	21/10/16	28/10/16	66	8	OA	22/20/2016	B/L	79	77	8	9	70	19	68	17	2	0
185	153755	GS	67	M	6/10/2016	11/10/2016	76	7	OA	7/10/2016	R	84	-	9	-	65	15	-	-	2	0
186	23753	VK	52	F	20/10/16	26/10/16	69	7	OA	21/10/2016	B/L	80	82	9	9	71	18	72	22	2	0
187	134849	PK	57	F	21/10/16	26/10/16	73	8	OA	22/10/2016	L	-	76	-	8	-	-	65	15	-	-
188	139994	KJ	66	F	1/11/2016	6/10/2016	63	7	OA	2/11/2016	L	-	79	-	9	-	-	66	16	-	-
189	142149	PB	54	F	4/11/2016	9/10/2016	60	6	OA	5/11/2016	R	74	-	8	-	60	12	-	-	2	0
190	151299	DJ	80	M	21/11/16	26/10/16	68	9	OA	22/11/16	R	82	-	9	-	71	24	-	-	3	1
191	137797	SK	50	F	23/11/16	29/11/16	74	6	OA	24/11/16	B/L	77	75	9	8	66	14	63	13	2	0
192	164766	SA	73	M	11/12/2016	17/12/16	73	7	OA	12/12/2016	B/L	80	79	8	8	68	18	65	15	2	0
193	163857	KR	57	F	12/12/2016	18/12/16	70	8	OA	13/12/16	B/L	78	74	9	8	66	18	64	16	2	0
194	152828	PK	60	F	12/12/2016	18/12/16	68	7	OA	13/12/16	B/L	73	75	8	8	61	16	66	16	2	0
195	162843	MK	53	M	18/12/16	23/12/16	62	6	OA	19/12/16	B/L	76	74	9	9	65	20	64	16	2	0
196	169898	PL	59	F	26/12/16	31/12/16	58	6	OA	27/12/16	R	79	-	9	-	67	15	-	-	2	0
197	191809	SC	55	F	19/12/16	25/12/16	60	7	OA	20/12/16	B/L	83	82	8	8	70	20	66	18	2	0
198	365139	SD	61	F	13/10/2017	23/10/17	67	5	OA	14/10/16	L	-	80	-	9	-	-	72	22	3	3
199	862650	JK	65	F	19/4/16	28/4/16	70	6	OA	20/4/16	R	83	-	9	-	72	22	-	-	3	3

S.No.	MRD/CR No	VAS score post op L 0	VAS score post op L 6 wks	WOMAC score Post op R 24 week	WOMAC score Post op L 24 week	VAS score post op R 24 week	VAS Score post op L 24 week	knee infection	knee infection	infection right side	infection left side	numbness right side	numbness left side
1	448789	5	2	-	11	-	0	-	-	-	-	-	-
2	488220	3	0	16	8	1	0	-	-	-	-	-	-
3	435839	4	0	0	0	0	0	-	-	-	-	-	-
4	439571	2	0	8	0	1	0	-	-	-	-	-	-
5	431871	3	0	4	6	0	0	-	-	-	-	-	-
6	220493	2	1	-	14	-	1	-	-	-	-	-	-
7	428588	3	1	20	0	2	1	-	-	-	-	-	-
8	523906	1	0	-	8	-	0	-	-	-	-	-	-
9	448532	1	0	8	10	1	0	-	-	-	-	-	-
10	446352	0	0	0	0	0	0	-	-	-	-	-	-
11	491091	0	1	4	8	3	1	-	-	-	-	-	-
12	8935	-	-	8	-	1	-	-	-	-	-	-	-
13	444220	-	-	8	-	0	-	-	-	-	-	-	-
14	524100	1	0	0	0	0	0	-	-	-	-	-	-
15	446552	3	1	8	4	2	1	-	-	-	-	-	-
16	462355	1	1	8	4	2	1	-	-	-	-	-	-
17	459586	1	0	-	4	-	0	-	-	-	-	-	-
18	490367	2	0	0	0	0	0	-	-	-	-	-	-
19	426944	1	1	8	2	2	1	-	-	-	-	-	-
20	228533	2	1	0	4	0	1	-	-	-	-	-	-
21	504641	2	0	-	0	-	0	-	-	-	-	-	-
22	504936	1	0	-	0	-	0	-	-	-	-	-	-
23	493352	1	0	4	0	1	0	-	-	-	-	-	-
24	504594	1	0	0	4	0	0	-	-	-	-	-	-
25	490230	1	0	8	0	1	0	-	-	-	-	-	-
26	466060	1	0	4	0	1	0	-	-	-	-	-	-
27	247231	1	0	-	2	-	0	-	-	-	-	-	-
28	492303	2	3	32	16	5	3	-	-	-	-	-	-
29	515719	3	2	4	8	1	2	-	-	-	-	-	-
30	465952	1	1	8	4	1	1	-	-	-	-	-	-
31	454885	1	0	4	8	1	0	-	-	-	-	-	-
32	428947	1	1	20	12	3	1	-	-	-	-	-	-
33	22825	1	0	4	0	1	0	-	-	-	-	-	-
34	451885	1	0	-	0	-	0	-	-	-	-	-	-
35	426940	2	1	-	8	-	1	-	-	-	-	-	-
36	499660	2	0	-	0	-	0	-	-	-	-	-	-
37	562431	1	0	4	4	1	0	-	-	-	-	-	-
38	567491	3	3	8	4	2	3	-	-	-	-	-	-
39	474967	0	0	8	4	1	0	-	-	-	-	-	-
40	141638	-	-	4	-	0	-	-	-	-	-	-	-
41	528315	-	-	12	-	2	-	-	-	-	-	-	-
42	340505	1	0	-	1	-	0	-	-	-	-	-	-
43	547513	2	1	-	1	-	1	-	-	-	-	-	-
44	637097	-	-	1	-	0	-	-	-	-	-	-	-
45	607621	1	0	-	0	-	0	-	-	-	-	-	-
46	624965	-	-	8	-	2	-	-	-	-	-	-	-
47	20204	3	1	1	0	0	1	-	-	-	-	present	present
48	558582	2	1	4	6	1	1	-	-	-	-	-	-
49	578518	2	0	-	2	-	0	-	-	-	-	-	-
50	575591	-	-	2	-	0	-	-	-	-	-	-	-
51	241022	-	-	3	-	1	-	-	-	-	-	-	-
52	637269	-	-	6	-	2	-	-	-	-	-	-	-
53	530069	3	1	-	8	-	1	-	-	-	-	-	-

S.No.	MRD/CR No	VAS score post op L 0	VAS score post op L 6 wks	WOMAC score Post op R 24 week	WOMAC score Post op L 24 week	VAS score post op R 24 week	VAS Score post op L 24 week	knee infection	knee infection	infection right side	infection left side	numbness right side	numbness left side
54	401789	2	0	-	0	-	0	-	-	-	present	-	-
55	496705	-	-	1	-	0	-	-	-	-	-	-	-
56	530444	3	0	0	0	0	0	-	-	-	-	-	-
57	541066	-	-	2	-	0	-	-	-	-	-	-	-
58	546341	1	1	4	0	1	0	-	-	-	-	-	-
59	635083	1	0	-	2	-	0	-	-	-	-	-	-
60	576487	1	0	0	0	1	0	-	-	-	-	-	-
61	522349	1	0	-	0	-	0	-	-	-	-	-	-
62	463300	1	0	10	0	1	0	-	-	-	-	-	-
63	255418	3	0	0	0	0	0	-	-	-	-	-	-
64	282989	3	0	-	0	-	0	-	-	-	-	-	-
65	322470	3	0	2	0	1	0	-	-	-	-	-	-
66	344619	1	1	0	4	0	1	-	-	-	-	-	-
67	378079	1	0	0	0	0	0	-	-	-	-	-	-
68	55505	1	0	4	2	0	0	-	-	-	-	-	-
69	401823	1	0	11	0	1	0	-	-	-	-	-	-
70	327690	1	1	0	6	0	1	-	-	-	-	-	-
71	351694	1	0	0	0	0	0	-	-	-	-	-	-
72	225702	2	0	0	3	0	1	-	-	-	-	-	-
73	196773	-	-	0	-	0	-	-	-	-	-	-	-
74	364445	1	0	0	0	0	0	-	-	-	-	-	-
75	277095	1	0	0	0	0	0	-	-	-	-	-	-
76	32616	2	0	-	2	-	0	-	-	-	-	-	-
77	68490	1	0	-	0	-	0	-	-	-	-	-	-
78	390998	3	0	-	13	-	0	-	-	-	-	-	-
79	332170	-	-	6	-	0	-	-	-	-	-	-	-
80	141553	3	1	-	6	-	1	-	-	-	-	-	-
81	228521	2	1	-	0	-	1	-	-	-	-	-	-
82	280065	3	0	4	5	0	0	-	-	-	-	-	-
83	288222	1	0	0	0	0	0	-	-	-	-	-	-
84	340925	1	0	0	0	0	0	-	-	-	-	-	-
85	345898	2	0	10	6	2	0	-	-	-	-	-	-
86	303680	2	1	0	8	0	1	-	-	-	-	-	-
87	310118	2	0	4	0	1	0	-	-	-	-	-	-
88	394708	3	1	0	9	0	1	-	-	-	-	-	-
89	146716	3	2	-	12	-	2	-	-	-	-	-	-
90	608426	2	0	-	7	-	0	-	-	-	-	-	-
91	353531	-	-	0	-	0	-	-	-	-	-	-	-
92	191516	-	-	0	-	0	-	-	-	-	-	-	-
93	288219	-	-	4	-	0	-	-	-	-	-	-	-
94	269801	3	0	0	0	0	0	-	-	-	-	-	-
95	256086	2	0	0	0	0	0	-	-	-	-	-	-
96	266873	2	0	-	0	-	0	-	-	-	-	-	-
97	258072	3	0	-	4	-	0	-	-	-	-	-	-
98	299959	-	-	11	-	1	-	-	-	-	-	-	-
99	289610	3	0	-	0	-	0	-	-	-	-	-	-
100	276370	2	0	0	0	0	0	-	-	-	-	-	-
101	245559	3	0	0	0	0	0	-	-	-	-	-	-
102	292456	2	0	6	0	1	0	-	-	-	-	-	-
103	263370	2	0	0	0	0	0	-	-	-	-	-	-
104	308420	2	0	-	0	-	0	-	-	-	-	-	present
105	291481	-	-	-	-	-	-	-	-	-	-	-	-
106	329124	3	0	0	0	0	0	-	-	-	-	-	-

S.No.	MRD/CR No	VAS score post op L 0	VAS score post op L 6 wks	WOMAC score Post op R 24 week	WOMAC score Post op L 24 week	VAS score post op R 24 week	VAS Score post op L 24 week	knee infection	knee infection	infection right side	infection left side	numbness right side	numbness left side
107	330952	-	-	0	-	0	-	-	-	-	-	-	-
108	211242	3	0	0	2	0	0	-	-	-	-	-	-
109	342596	-	-	0	-	0	-	-	-	-	-	-	-
110	308308	3	1	0	10	0	1	-	-	-	-	-	-
111	322554	2	0	-	0	-	0	-	-	-	-	-	-
112	346357	3	0	0	0	0	0	-	-	-	-	-	-
113	290819	3	1	6	11	1	1	-	-	-	-	-	-
114	383831	2	0	0	0	0	0	-	-	-	-	-	-
115	390784	2	0	4	0	0	0	-	-	-	-	-	-
116	362018	2	0	-	4	-	0	-	-	-	-	-	-
117	383074	2	0	0	1	0	0	-	-	-	-	-	-
118	354440	3	0	0	0	0	0	-	-	-	-	-	-
119	46789	3	0	6	8	0	1	-	-	-	-	-	-
120	358845	2	0	2	0	0	0	-	-	-	-	-	-
121	362014	3	0	-	0	-	0	-	-	-	-	-	-
122	411681	3	0	0	0	0	0	-	-	-	-	-	-
123	390648	-	-	0	-	0	-	-	-	-	-	-	-
124	406584	2	0	0	0	0	0	-	-	-	-	-	-
125	409942	-	-	0	-	0	-	-	-	-	-	-	-
126	374301	2	0	-	0	-	0	-	-	-	-	-	-
127	253290	2	0	-	0	-	0	-	-	-	-	-	-
128	13543	2	0	2	0	0	0	-	-	-	-	-	-
129	3827	2	0	-	0	-	0	-	-	-	-	-	-
130	34736	2	0	0	0	0	0	-	-	-	-	-	-
131	38452	-	-	0	-	0	-	-	-	-	-	-	-
132	122226	2	0	-	0	-	0	-	-	-	-	-	-
133	33686	-	-	0	-	0	-	-	-	-	-	-	-
134	41262	2	0	0	2	0	0	-	-	-	-	-	-
135	49026	2	0	2	0	0	0	-	-	-	-	-	-
136	49599	2	0	0	0	0	0	-	-	-	-	-	-
137	49747	3	0	0	0	0	0	-	-	-	-	-	-
138	78089	2	0	1	3	0	1	-	-	-	-	-	-
139	269340	4	1	1	-	1	-	present	-	-	-	-	-
140	78463	1	0	-	0	-	0	-	-	-	-	-	-
141	122364	-	-	0	-	0	-	-	-	-	-	-	-
142	76009	-	-	1	-	0	-	-	-	-	-	-	-
143	82874	-	-	3	-	2	-	-	-	-	-	-	-
144	75065	-	-	0	-	0	-	-	-	-	-	-	-
145	90061	3	1	0	1	0	1	-	-	-	-	-	-
146	45763	-	-	2	-	1	-	-	-	-	-	-	-
147	95599	2	0	1	0	1	0	-	-	-	-	-	-
148	88714	3	1	1	2	1	2	-	-	-	-	-	-
149	98081	2	0	0	0	0	0	-	-	-	-	-	-
150	80797	-	-	0	-	0	-	-	-	-	-	-	-
151	91401	3	2	0	0	0	0	-	-	-	-	-	-
152	85133	3	2	0	0	0	0	-	-	-	-	-	-
153	110821	-	-	-	2	-	0	-	-	-	-	-	-
154	109191	-	-	3	-	2	-	-	-	-	-	-	-
155	108264	-	-	0	-	0	-	-	-	-	-	-	-
156	114207	2	0	0	0	0	0	-	-	-	-	-	-
157	115228	-	-	1	-	1	-	-	-	-	-	-	-
158	117038	2	0	0	0	0	0	-	-	-	-	-	-
159	119685	3	1	0	2	0	1	-	-	-	-	-	-

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160	120338	2	1	0	1	0	1	-	-	-	-	-	-
161	121591	2	0	0	0	0	0	-	-	-	-	-	-
162	123761	2	0	0	0	0	0	-	-	-	-	-	-
163	123961	-	-	0	-	0	-	-	-	-	-	-	-
164	130590	2	0	2	0	1	0	-	-	-	-	-	-
165	131920	3	0	0	0	0	0	-	-	-	-	-	-
166	132264	-	-	0	-	0	-	-	-	-	-	-	-
167	132739	3	0	-	0	-	0	-	-	-	-	-	-
168	132888	2	0	0	0	0	0	-	-	-	-	-	-
169	139570	2	0	0	0	0	0	-	-	-	-	-	-
170	134995	3	0	-	0	-	0	-	-	-	-	-	-
171	139156	2	1	1	0	1	0	-	-	-	-	-	-
172	139099	2	0	-	0	-	0	-	-	-	-	-	-
173	143042	2	0	0	0	0	0	-	-	-	-	-	-
174	110207	2	0	-	0	-	0	-	-	-	-	-	-
175	148703	2	1	2	0	1	0	-	-	-	-	-	-
176	147528	2	0	0	0	0	0	-	-	-	-	-	-
177	149365	3	0	-	0	-	0	-	-	-	-	-	-
178	149376	2	0	0	0	0	0	-	-	-	-	-	-
179	151786	-	-	0	-	0	-	-	-	-	-	-	-
180	119912	2	1	-	1	-	1	-	-	-	-	-	-
181	129070	2	0	-	0	-	0	-	-	-	-	-	-
182	155345	-	-	2	-	1	-	-	-	-	-	-	-
183	46018	2	0	1	0	1	0	-	-	-	-	-	-
184	133216	2	0	0	0	0	0	-	-	-	-	-	-
185	153755	-	-	0	-	1	-	-	-	-	-	-	-
186	23753	3	2	0	2	0	1	-	-	-	-	-	-
187	134849	2	0	-	0	-	0	-	-	-	-	-	-
188	139994	2	0	-	0	-	0	-	-	-	-	-	-
189	142149	-	-	0	-	0	-	-	-	-	-	-	-
190	151299	-	-	3	-	2	-	-	-	-	-	-	-
191	137797	2	0	0	0	0	0	-	-	-	-	-	-
192	164766	2	0	0	0	0	0	-	-	-	-	-	-
193	163857	2	0	0	0	0	0	-	-	-	-	-	-
194	152828	2	0	0	0	0	0	-	-	-	-	-	-
195	162843	2	0	2	0	1	0	-	-	-	-	-	-
196	169898	-	-	0	-	0	-	-	-	-	-	-	-
197	191809	2	0	0	0	0	0	-	-	-	-	-	-
198	365139	2	0	-	4	-	3	-	present	-	-	-	-
199	862650	-	-	3	-	3	-	present	-	-	-	-	-

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No. BFUHS/2K18p-TH/14155 Date 4/10/18

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 31.08.2018 has approved the plan of thesis of Ashish Kumar, a student of your college for **MS Orthopaedics** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Evaluation of anterior knee pain and other complications in total knee arthroplasty without patellar resurfacing

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The student may submit the four copies of thesis, to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She may be directed to attach a photocopy of this letter with the forwarding letter while submitting thesis in the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic, if any.

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

Master of surgery
in

ORTHOPAEDICS

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

JANUARY, 2018

DR. ASHISH KUMAR

DEPARTMENT OF ORTHOPAEDICS
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING
For the degree of	MS ORTHOPAEDICS
Name of the candidate	DR. ASHISH KUMAR
Supervisor	DR. MOHAMMAD YAMIN
Co-supervisor	DR. PANKAJ MAHINDRA DR. HARPAL SINGH SELHI
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Osteoarthritis is one of the most common indication of total knee arthroplasty. Whether to resurface patella during total knee arthroplasty for osteoarthritis remains a controversial issue. There were comparable clinical outcomes between total knee arthroplasty with or without resurfacing. These conflicting results are an indication that larger and more well conducted high quality trials are needed in order to gain more secure answers. The aim of this study is to evaluate postoperative complications of total knee arthroplasty without resurfacing which includes anterior knee pain and other complications.

Aim of Study: Evaluation of anterior knee pain and other complications in total knee arthroplasty without patellar resurfacing.

Materials & methods: Study will be conducted on inpatients in department of orthopedics in teaching hospital attached to Dayanand Medical College & Hospital, Ludhiana from January 2016 to december 2019 who have given valid informed consent to take part in the study. A structured pre designed proforma will be used for this study.

Clinical Significance: Postopertive complications are anterior knee pain, patellar fracture, patellar clunk syndrome, patellofemoral instability, patellar component loosening.

Keywords: Anterior knee pain, patella

(Signature)	(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Co-supervisor	Co-supervisor	Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING"** exist in the Department of Orthopaedics, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate himself under our supervision and guidance.

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Place : Ludhiana

Date : 19/1/18

APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. Ashish Kumar
Department	Orthopaedics
Topic of Thesis	EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING
Likely date of appearing in PG examination	May 2020
Date of enrollment	31th May, 2017
Name of Head of Department	Dr. Rajnish Garg
1) Supervisor	Dr. Mohammad Yamin
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Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
1. HOD Pharmacology	1. HOD Physiology
2. HOD Surgery	2. HOD Pathology
3. HOD Pathology	3. HOD Pharmacology
4. HOD Medicine	4. HOD SPM
5. Dean Academics	5. HOD Medicine
6. Vice Principal	6. HOD Surgery
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	9. Secretary, IEC
	10. Dean Academics
	11. Vice Principal
	12. Principal

Approved : (Yes) / No

Chairperson
Research Committee

Chairperson
Research Committee

Approved : (Yes) / No

Chairperson
Ethics Committee

Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

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2	NAME OF THE INSTITUTE	DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA
3	COURSE OF STUDY AND SUBJECT	M.S. ORTHOPAEDICS
4	DATE OF ADMISSION OF COURSE	31 May, 2017
5	TITLE OF THE TOPIC	EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Osteoarthritis is one of the most common indication of total knee arthroplasty. Modern total knee arthroplasty is effective at treating pain and disability associated with osteoarthritis. Total knee arthroplasty can be with or without patellar resurfacing. McKeever was the first to publish results of patellar resurfacing in 1955. There are three approaches to total knee arthroplasty i.e Never resurface, Always resurface, and Selectively resurface the patella. Unfortunately, systematic reviews, meta-analyses and randomized clinical trials (RCTs) have been unable to demonstrate clear superiority of one approach over the other .Whether to resurface patella during total knee arthroplasty for osteoarthritis remains a controversial issue. There were comparable clinical outcomes between total knee arthroplasty with or without resurfacing. These conflicting results are an indication that larger and more well conducted high quality trials are needed in order to gain more secure answers. Opponents of resurfacing contend that the native patella provides better patellar tracking, improved clinical function, and avoids implant- related complications, whilst proponents argue that patients experience less pain, so needs patellar resurfacing. So the question remains whether complications with resurfacing outweigh the increased incidence of anterior knee pain recorded in non resurfaced patella. There are some studies that show some patients suffer anterior knee pain even with patellar resurfacing. So, there is need to devote efforts in defining predictive criteria and indicators that will enable to identify who might benefit from resurfacing and non resurfacing. Several techniques continue to evolve aiming to improve patient safety and

outcomes. Conservation of patellar bone, reduces likelihood of patellar osteonecrosis, more physiological patello-femoral kinematics, ability to withstand high patello-femoral forces especially in younger and more active patients without the concern of prosthetic wear or failure. Inspite of modern TKA designs variations in the incidence of anterior knee pain, with reported figures of 0° to 47 % in patients with patellar resurfacing and of 0° to 43 % in those patients where the patella is retained continues to occur. These variations mainly due to differences in pain assessment, patient selection, surgical technique and implant design. Total knee arthroplasty is one of the most successful and cost effective intervention, but still post-operative complications do occur. The aim of this study is to evaluate postoperative complications of total knee arthroplasty without resurfacing which includes anterior knee pain and other complications like patellar clunck syndrome, patellofemoral instability.

6.2 REVIEW OF LITERATURE

Osteoarthritis of the knee is one of the causes of disability over 75 years of age.[1,2] One of the main symptoms is knee pain which results in limited functional activities, decreased flexion range ,quadriceps thickness, and gait limitations.[3] Total knee arthroplasty (TKA) has proven to be cost effective and reliable treatment for symptomatic osteoarthritis, reforming the quality of life.[4] The major reason for considering knee replacement surgery is to relieve the pain due to osteoarthritis once all other non-surgical interventions have been shown to be unsuccessful. Despite overwhelming success of TKA, dissatisfaction with the results of surgery are mainly due to implant impositioning that include deviation greater than three degrees from goal alignment, abnormal wear, premature loosening and early implant failure.[5,6] Earlier pure tibio-femoral replacements, were designed to treat severe axial deformities and intractable knee pain in patients affected by either tuberculosis or rheumatoid arthritis.[7] Patello-femoral joint, and associated patellar complications were often ignored and treated with patellectomy. Arthroplasty was just an alternative to arthrodesis and performed in patients of extremely low demand, where any improvement in pain relief or mobility level was considered a success. Patella is exposed to the metallic surface of the femoral component in non resurfaced cases. The articular surface of the patella should adapt to the geometry of the opposing surface by bedding in by the process of biological remodelling, also called as 'stress contouring'. Anterior knee pain is most of the times due to inappropriately shaped articulating surface for the native patella .Despite advances in engineering, modern TKA designs continue to show a wide variations In the incidence of

AKP, with reported figures of 0° to 47 % in patients with patellar resurfacing and of 0° to 43 % in those patients where the patella is retained.[8] Wound dehiscence is the breaking open of the surgical incision along the stitch. This is another severe complication of total knee arthroplasty, which is a common orthopedic surgery. Primary wound healing is critical for the success of any total knee arthroplasty. Its prevalence is 0.33% to 50%. Risk factors for wound dehiscence include intraoperative, postoperative factors and patient-specific. Intra operative factors are related to the location of the incision; the creation of large laterally based skin flaps, which have inferior blood supply; and poor soft-tissue handling. Other factors are age, peripheral vascular disease, infection, obesity, smoking, patient's inadequate nutrition, increased pressure applied to the wound edges (generated by straining or lifting, coughing, sneezing, vomiting), corticosteroids chronic usage, previous scarring. Wound healing complications are also commonly seen in patients with diabetes Mellitus and obesity.[9]

Patella fractures associated with TKR have a prevelance of between 0.15% and 12% although fractures of unresurfaced patella have been observed, they are much more likely to occur after resurfacing.[10]

Resurfacing is associated with good clinical results but is also associated with a small risk of patellar fracture or need for patellar revision in the future. Nonresurfacing of the patella may prevent such problems but is associated with a higher rate of anterior knee pain and reoperation.[11]

E. carlos et al [12] performed a prospective, randomized study of 500 TKAs. They carried out PR depending on the Outerbridge classification of the patella at the time of surgery. Patients with Outerbridge Grades I, II, and III formed

Group A, whereas patients with Grade IV formed Group B. Within each group, resurfacing was completed on half of the patients. Group A had 328 patients (164 with PR, 164 without PR). In Group B, there were 172 patients (86 with PR, 86 without PR). An identical prosthetic design was used for both groups. The minimum followup was 5 years (average, 7.8 years) for both Group A and Group B. At the end of followup, we assessed the number of patients in each group that required secondary resurfacing as a result of patellofemoral pain. Patients in Group A required fewer revisions for PF pain. In Group A, only one patient required a secondary PR (0.6% rate), whereas in Group B, 10 patients needed PR (11.6% rate). In Group B, the risk of need of a patellar resurfacing was 21.5 times greater than in Group A. On the basis of these findings, we recommend PR in Outerbridge Grade IV patellae, but not in Grades I, II, and III Revision surgery to resurface the patella because of patellar pain was required more often in Group B than Group A ($p = 0.001$). In Group A, only one patient required a secondary PR (0.6%), whereas in Group B, 10 patients needed PR (11.6%). The odds ratio value was 21.5 indicating that in Group B, the risk of needing a revision for patellar resurfacing resulting from anterior knee pain was 21.5 times greater than in Group A.

In the patient who was reoperated in Group A, we observed a deterioration of the patellar cartilage. The cartilage was initially Grade II and at reoperation it became Grade III.

Fu Y, et al [13] studied whether to resurface the patella during primary total knee arthroplasty. A meta analysis of ramdomised controlled trials comparing patellar resurfacing with non resurfacing during total knee arthroplasties was performed. Ten trials asseseing 1,003 knees were eligible. The absolute risk

of reoperation was reduced by 4%(95% confidence interval, 1-7%) in patellar resurfacing arm (between-study heterogeneity, P=0.06, I (2)=45%), implying that one would have to resurface 25 patallae (95% confidence interval, 14-100 patallae) in order to prevent one operation. Only seven trials provided adequate data of anterior knee pain for quantitative synthesis. On the basis of those seven trials, there was no difference between the two groups in terms of anterior knee pain.

Emilios et al [14] performed a meta-analysis of randomized controlled trials comparing total knee arthroplasties performed with and without patellar resurfacing. Outcomes of interest included the number of reoperations, the prevalence of postoperative anterior knee pain, and the improvement in various knee scores. They concluded that patellar resurfacing reduces the risks of reoperation and anterior knee pain after total knee arthroplasty.

Chen, Kai et al [15] carried out a meta-analysis of randomised controlled trials comparing total knee arthroplasties performed with and without patellar resurfacing. Outcomes of reoperation, anterior knee pain and knee scores were analysed. By this meta-analysis of 1,725 randomised trials, they found that the rate of reoperation was lower following total knee arthroplasty with patellar resurfacing than after total knee arthroplasty without patellar resurfacing. But there was no difference between the two groups in terms of anterior knee pain. Interestingly they found that during the long-term follow-up (five or more years), the patellar resurfacing group might achieve a higher Knee Society score than the nonresurfacing group. This new conclusion is different from many of the past systematic studies. More high quality and well-

designed RCTs with long-term follow-up are needed to support this conclusion.

Schiavone Panni, Alfredo et al [16] studied the charts of 1,600 consecutive total knee prostheses to evaluate the rate of patellar resurfacing. All implants were posterior stabilized; 310 patients having received a patellar replacement were reviewed at follow-up (FU) examination. Complete physical examination as well as administration of the Hospital for Special Surgery (HSS) score was performed. X-rays analysis included weight bearing anteroposterior (AP) and lateral views of the injured knee and bilateral skyline views at 30° flexion. Their data was in accordance with those available in the literature. Recent meta-analyses demonstrated lower risk of re-operation after patellar resurfacing. However, when complications of the resurfaced patella occur, they can be potentially catastrophic events.

Beaupre, Lauren et al[17] did study on 38 subjects with non-inflammatory arthritis randomized at primary TKA surgery to receive patellar resurfacing (n = 21; Resurfaced group) or to retain their native patella (n = 17; Non-resurfaced group). Evaluations were performed preoperatively, one, five and 10 years postoperatively. Self-reported knee-specific stiffness, pain and function, the primary outcomes, were measured by the Western Ontario McMaster Osteoarthritis Index (WOMAC). They concluded that there was no difference in knee-specific results between groups at 5–10 years postoperatively. The Non-resurfaced group had two revisions due to anterior knee pain similar to rates reported in other studies.

6.3 AIMS AND OBJECTIVES OF THE STUDY

To evaluate of anterior knee pain and other complications in patients with total knee arthroplasty without patellar resurfacing

7. MATERIALS AND METHODS

7.1 Source of Data

Patients in age group 40 to 80 years with primary osteoarthrithis of knee undergoing either unilateral or bilateral primary total knee arthroplasty without patellar resurfacing at the department of orthopedics in teaching hospital attached to Dayanand Medical College & Hospital, Ludhiana from January 2016 to December 2018 who have given valid informed consent to take part in the study.

7.2 METHOD OF COLLECTION OF DATA

A. Methodology and type of data collected:

After obtaining clearance and approval from the institutional ethical committee, patients fulfilling the inclusion / exclusion criteria will be included in the study after obtaining informed consent.

Detailed history will be obtained using study proforma with special attention to evaluations including base line clinical features, examination of other associated symptoms will be based on history and physical examination.

Collection of data of patients presenting with anterior knee pain are as follows.

- History.
- Clinical examination both systemic and local.
- Radiological examination routine other imaging modalities.
- Investigations –which are necessary for anesthetic fitness.
- Diagnosis- Clinical and radiological.
- Surgery- Total knee arthroplasty without patellar resurfacing

- Routine antibiotics and analgesics/anti-inflammatory drugs.

- DVT prophylaxis

-Evaluation by X rays

-Physiotherapy and functional rehabilitation

Surgical approaches: Standard techniques as per surgeon choice.

Medial parapatellar

Mid vastus split

Subvastus

Lateral

Assessment of complications.

Clinical follow-up will be done at 4 weeks, 1 ½ months, 6 months intervals to assess the anterior knee pain and other complication

INCLUSION CRITERIA

Patient in age group 40 to 80 years of either sexes with primary osteoarthrithis of knee undergoing either unilateral or bilateral total knee arthroplasty without patellar resurfacing.

Patient with total knee arthroplasty done on one side undergoing total knee arthroplasty without patellar resurfacing on other side.

Patients who give informed consent and willing for follow up.

EXCLUSION CRITERIA-

Total knee arthroplasty with patellar resurfacing

Patient with congenital deformity of hip or lower limb.

Patients less than 40 years of age.

Study design: 1 year prospective and 2 year retrospective

Study period: January 2016 to December 2018

Study duration: 3 year

Place of study: Inpatients in Department of Orthopedics in teaching hospital attached to Dayanand Medical College & Hospital, Ludhiana

OUTCOME

Evaluation of anterior knee pain and other complication (stiffness, physical function i.e walking, climbing up and downstairs) was assessed post operatively at 6 month on review in OPD and point were assigned as per womac score and visual analogue scale.

STATISTICAL ANALYSIS

The data collected will be recorded in a pro forma and will be analysed using appropriate observational statistical methods

DURATION OF THE STUDY

1 year-prospective (January 2018 – December 2018)

2 year – retrospective (January 2016- December 2017)

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

- Investigations – Routine and others if required.
- Radiological examination using X ray.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

yes

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PROFORMA

NAME : SERIAL NO.

AGE :

SEX :

RELIGION :

M.R.D. NO. :

DATE OF ADMISSION :

DATE OF DISCHARGE :

WEIGHT :

DURATION OF SYMPTOMS :

DIAGNOSIS :

DATE OF SURGERY :

SIGNATURE OF CANDIDATE SIGNATURE OF SUPERVISOR

PRE OPERATIVE RANGE OF FLEXION:

POST OPERATIVE RANGE OF FLEXION:

PRE OPERATIVE VARUS DEFORMITY:

POST OPERATIVE VARUS DEFORMITY:

PRE OPERATIVE EXTENSION LAG:

POST OPERATIVE EXTENSION LAG:

OTHER COMPLICATION:

MAC SCORE AT PREOPERATIVE:

SIGNATURE OF CANDIDATE

SIGNATURE OF SUPERVISOR

PRE OPERATIVE RANGE OF FLEXION :

POST OPERATIVE RANGE OF FLEXION :

PRE OPERATIVE VARUS DEFORMITY :

POST OPERATIVE VARUS DEFORMITY :

PRE OPERATIVE EXTENSION LAG :

POST OPERATIVE EXTENSION LAG :

OTHER COMPLICATION :

WOMAC SCORE AND VAS AT :

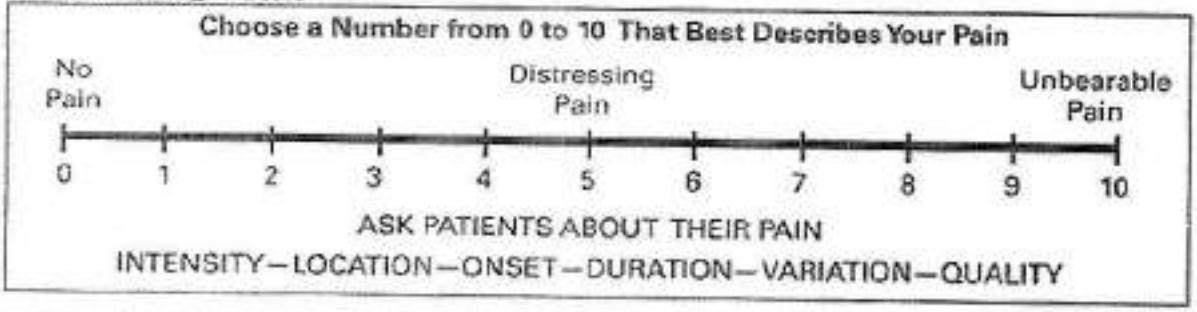
WOMAC SCORE	0 WEEK	6 WEEK	24 WEEK
0 WEEK			
6 WEEK			
24 WEEK			
VISUAL ANALOGUE SCALE FOR PAIN			
0 WEEK			
6 WEEK			
24 WEEK			
Complications			

SIGNATURE OF CANDIDATE

SIGNATURE OF SUPERVISOR

Figures: Tools Commonly Used to Rate Pain

Visual Analogue Scale


Choose a Number from 0 to 10 That Best Describes Your Pain
No Pain
Distressing Pain
Unbearable Pain
0 1 2 3 4 5 6 7 8 9 10
ASK PATIENTS ABOUT THEIR PAIN
INTENSITY—LOCATION—ONSET—DURATION—VARIATION—QUALITY

SIGNATURE OF CANDIDATE

SIGNATURE OF SUPERVISOR

THE WESTERN ONTARIO AND McMASTER UNIVERSITIES OSTEOARTHRITHIS INDEX

(WOMAC)

NAME :

DATE :

INSTRUCTION :- RATE THE ACTIVITIES IN EACH CATEGORY ACCORDING TO THE FOLLOWING SCALE DIFFICULTY: 0= NONE, 1=SLIGHT, 2= MODERATE, 3= VERY, 4= EXTREMELY

CIRCLE ONE NUMBER FOR EACH ACTIVITY.

PAIN:-

1. WALKING
2. STAIR CLIMBING
3. NOCTURNAL
4. REST
5. WEIGHT BEARING

STIFFNESS:-

1. MORNING STIFFNESS
2. STIFFNESS OCCURING LATER IN THE DAY

PHYSICAL FUNCTION :-

1. DESCENDING STAIRS
2. ASCENDING STAIRS
3. RISING FROM SITTING
4. STANDING
5. BENDING TO FLOOR
6. WALKING ON FLAT SURFACE

SIGNATURE OF CANDIDATE SIGNATURE OF SUPERVISOR

7. GETTING IN / OUT OF CAR
8. GOING SHOPPING
9. PUTTING ON SOCKS
10. LYING IN BED
11. TAKING OFF SOCKS
12. RISING FROM BED
13. GETTING IN / OUT OF BATH
14. SITTING
15. GETTING ON/OFF TOILET
16. HEAVY DOMESTIC DUTIES
17. LIGHT DOMESTIC DUTIES

TOTAL SCORE : _____/ 96 = _____%

HIGHER SCORE ON THE WOMAC INDICATE WORSE PAIN, STIFFNESS AND FUNCTIONAL LIMITATION)

SIGNATURE OF CANDIDATE

SIGNATURE OF SUPERVISOR

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

.....am willing to participate in the study **"EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/ /पुत्र/पुत्री _____

निवासी _____ इस शोधकार्य **"EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"EVALUATION OF ANTERIOR KNEE PAIN AND OTHER COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY WITHOUT PATELLAR RESURFACING" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____

ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ